

Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan

January 2013

Developed by Laramie County, the City of Cheyenne,
and the Towns of Albin, Burns, and Pine Bluffs
with professional planning assistance from
AMEC Environment and Infrastructure
Hazard Mitigation and Emergency Management Program



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1 INTRODUCTION

1.1 Purpose

Laramie County and the City of Cheyenne, Wyoming, along with the participating jurisdictions of the Town of Albin, Town of Burns, and the Town of Pine Bluffs, have prepared this local hazard mitigation plan to guide hazard mitigation planning to better protect the people and property of the County from the effects of hazard events. This plan, updated in 2012, demonstrates the communities' commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This plan was also developed to make Laramie County, the City of Cheyenne, and participating jurisdictions eligible for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation program, as well as to make the County more disaster resistant. Flood Mitigation Assistance (FMA) and other funding opportunities may be available.

1.2 Background and Scope

Each year in the United States, disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters, because additional expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of \$4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2005).

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. This plan documents Laramie County and the City of Cheyenne's hazard mitigation plan update process, identifies relevant hazards and risks, and identifies the strategy the County, City, and participating jurisdictions will use to decrease vulnerability and increase resiliency and sustainability.

This plan update was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule

published in the *Federal Register* on February 26, 2002 (44 CFR §201.6) and finalized on October 31, 2007. (Hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act or DMA.) While the act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Because the Laramie County planning area is subject to many kinds of hazards, access to these programs is vital.

The Laramie County mitigation planning process for the 2005 County Hazard Mitigation Plan (HMP) began in March of 2001 with the development of a draft mitigation and strategy plan. For this early effort a Laramie County hazard mitigation team was established to assist in plan development. The team was composed of the Laramie County Emergency Management Agency; the Laramie County Emergency Planning Committee (LEPC); local citizens; the Wyoming State Geological Survey; elected officials and representatives from Albin, Burns, Cheyenne, and Pine Bluffs; and emergency service representatives. The team met several times between 2001 and 2004 to discuss, develop, and review the plan. A draft was submitted to the Wyoming Emergency Management Agency, as it was then known, in March 2003. The plan was adopted in April 2005.

The planning process for the 2005 City of Cheyenne HMP began in January 2005. Members of the City Planning Committee drafted the 2005 plan between January and February 2005, meeting bi-weekly to discuss various parts of the plan. The final plan was submitted to FEMA on February 28, 2005. The planning process continued through May 2005 with presentations to the public, the Laramie County LEPC, the Plan Cheyenne Technical Advisory Committee, and the Citizen Steering Committee.

The two plans were combined and updated in 2012 according to the five year update requirement. Information in this plan update will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to the community and its property owners by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruption. The Laramie County planning area has been affected by hazards in the past and is thus committed to reducing future disaster impacts and maintaining eligibility for federal funding.

1.3 Multi-Jurisdictional Planning

This plan was prepared as a multi-jurisdictional plan. The planning area encompasses all of Laramie County, the City of Cheyenne, Town of Albin, Town of Burns, and the Town of Pine Bluffs. All local units of government in the County were invited to participate in the planning process. The decision whether or not to participate in this process was a local decision, based on

local community needs. Local governments have the options not to prepare a plan, to prepare a stand-alone plan for their jurisdiction, or to participate in a multi-jurisdiction or county-wide plan. The following entities meet the definition of a local government per the DMA regulations and have opted to participate in this effort and are seeking FEMA approval of the 2012 version of this plan. Entities that participated in the plan are noted below. Additional detail about participation can be referenced in Chapter 3, and Appendices B and C.

Participating entities

Laramie County

City of Cheyenne

Town of Albin

Town of Burns

Town of Pine Bluffs

1.4 Plan Organization

The 2012 Combined Laramie County Hazard Mitigation and Strategy Plan is organized as follows:

- Chapter 1: Introduction
- Chapter 2: Community Profile
- Chapter 3: Planning Process
- Chapter 4: Risk Assessment
- Chapter 5: Mitigation Strategy
- Chapter 6: Plan Adoption
- Chapter 7: Plan Implementation and Maintenance

Appendix A includes further details on the hazard mitigation action items identified in Chapter 5 and is a key aspect of this plan. Appendix B catalogs the documents used during the 2012 planning process, such as meeting sign in sheets, meeting minutes, public notices, etc. Appendix C lists the members who served on the 2012 Hazard Mitigation Planning Committee (HMPC). A list of references is provided in Appendix D, and a draft plan adoption ordinance is available for the HMPC's reference in Appendix E. Appendix F contains a detailed inventory of critical facilities in Laramie County broken out by name, jurisdiction, and facility type. Appendix G lists the historic resources in the planning area.

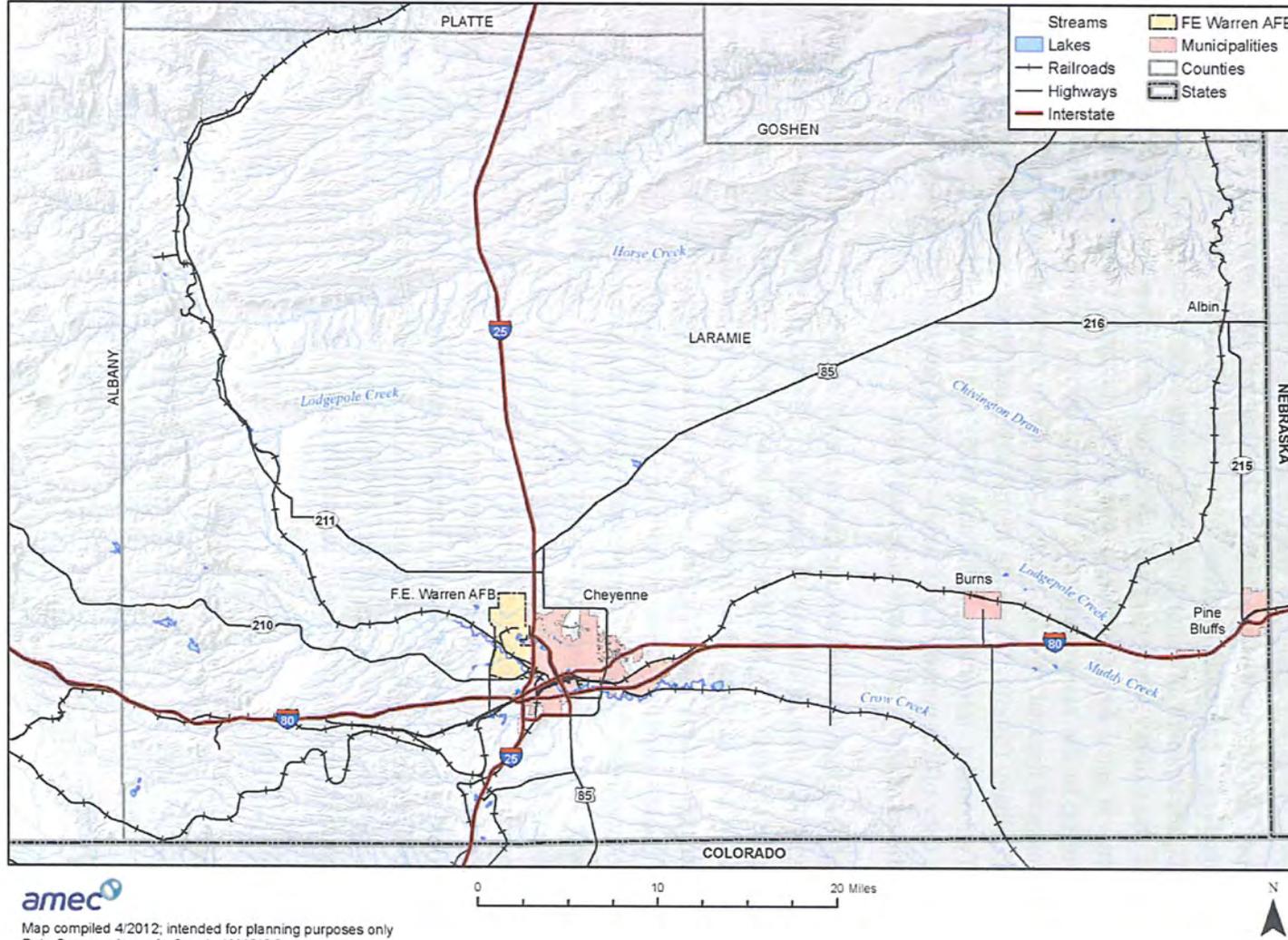
2 COMMUNITY PROFILE

2.1 Geography and Climate

Laramie County, depicted in Figure 2.1, is located in the southeastern corner of the State of Wyoming. It is the most populous county in Wyoming and the location of the State's capital, the City of Cheyenne. The City of Cheyenne also serves as the Laramie County seat. Laramie County is known for its old American West character and heritage, which is still evident today. Laramie County lies on the western edge of the Great Plains. Moving westward through the County, the landscape gradually evolves into the foothills of the Southern Laramie Mountain Range. Bluffs, escarpments, rolling hills, and streams add to the striking scenery. The plains topography of the County lends itself to agriculture, and indeed, roughly 80% of the land in Laramie County is used for agricultural purposes. Laramie County is bordered by Goshen County, Wyoming to the north-northeast; Banner County, Nebraska to the northeast; Kimball County, Nebraska to the east; Weld County, Colorado to the south; Larimer County, Colorado to the southwest; Albany County, Wyoming to the west; and Platte County, Wyoming to the north-northwest. Two major interstates, I-80 and I-25, and two railroads cross through Laramie County in the City of Cheyenne. The County is 2,688 square miles in size. 2,686 square miles are land and the remaining two square miles are water.

Laramie County has four distinct seasons and averages roughly 233 days of sunshine per year (or approximately a 66% annual chance of sunshine). Elevation in the County ranges from 5,000 feet in the eastern plains to 8,500 feet in the west. Data from the Western Regional Climate Center (WRCC) was used to characterize the climate in Laramie County. In the City of Cheyenne area, the warmest month is July with an average high of 82.7°F and an average low of 54.7°F. The coolest month is January with an average high of 37.8°F and an average low of 15.7°F. The warmest recorded temperature near Cheyenne was 100°F, and the coolest temperature was -34°F. Average annual precipitation is 15.18 inches per year, and average annual snowfall is 55.6 inches per year. Vegetation in the area consists of grasses, shrubs, and timber. Temperatures near Albin, Burns, and Pine Bluffs were comparable to those in Cheyenne, with July being the warmest month with temperatures in the mid to high 80s and January being the coldest month with lows in the teens. Regarding precipitation, Albin generally receives more moisture than Cheyenne with an average annual total precipitation of 18.05 inches average annual total snowfall of 70.1 inches. Pine Bluffs receives 15.21 inches of average annual total precipitation and 27.1 inches of average annual total snowfall.

Figure 2.1. Laramie County



amec
 Map compiled 4/2012; intended for planning purposes only
 Data Sources: Laramie County, WYGISC.

2.2 History

Laramie County is named for Jacques La Ramee, a French-Canadian fur trader who moved to the Laramie County area in 1815 to trap along the Laramie River. Laramie County was created in 1867 and was first a part of the Dakota Territory, named for the Sioux branch that occupied the area at the time. Laramie County became part of the Wyoming territory in 1869. The boundaries of Laramie County changed considerably since its creation in 1867. Sweetwater, Albany, Carbon, Crook, Converse, Goshen, and Platte counties were all at least partially created by land ceded from Laramie County. Laramie County's current boundaries were established in 1911.

United States settlement of the area grew relatively slowly until the spread of railroads allowed greater numbers of people to arrive. Prior to that, the area was explored as part of the Louisiana Purchase. People traveled through the Laramie County area on their way to California, Utah, and other western states during the 1800s as the Wyoming Basin provides a natural pass across the Rocky Mountains. The arrival of the Transcontinental Railroad, which crossed through Cheyenne, enabled further settlement in the 1860s. Pine Bluffs and Burns were also largely established by the railroads.

2.3 Population and Development Trends

According to the U.S. Census Bureau the estimated 2010 population of Laramie County was 91,738 people. Laramie County has grown by 12.4% since the 2000 U.S. Census. Population estimates for 2000 and 2010 for the City of Cheyenne, the Town of Albin, the Town of Burns, the Town of Pine Bluffs, and the unincorporated county are provided in Table 2.1. Based on the table each jurisdiction has seen growth with the exception of the Town of Pine Bluffs, which lost a small number of people. Most of the growth has occurred in the unincorporated county and City of Cheyenne.

Table 2.1. Laramie County 2000 and 2010 Population Estimates

Jurisdiction	2000	2010
City of Cheyenne	53,011	59,466
Town of Albin	120	181
Town of Burns	285	301
Town of Pine Bluffs	1,153	1,129
Unincorporated Laramie County	27,038	30,661
Total Laramie County	81,607	91,738

Source: U.S. Census Bureau

Select Census 2010 demographic and social characteristics for Laramie County are shown in Table 2.2. These statistics can be compared to the national averages to indicate social

vulnerability. A population with a high percentage of people under 5 years of age or over 65 years of age may have increased social vulnerability; members of these age groups may require additional assistance or resources to find shelter or evacuate during an emergency. According to the 2010 U.S. Census, 13.1% of the nation's population is 65 years of age or older, and 6.5% of the population is under 5 years old. All jurisdictions except for the Town of Pine Bluffs have a higher percentage of persons less than 5 years of age. The Town of Albin in particular had a much higher percentage of persons under 5 years old at 13.8%, 7.3 percentage points higher than the national average. In terms of the percentage of the population 65 years or older, Laramie County and the City of Cheyenne are relatively close to the national average. The Town of Albin has a very small percentage of persons 65 years or older, while Burns and Pine Bluffs have a rather high senior population compared to the national average. These statistics imply that the three towns have higher than average social vulnerability in certain age groups.

Table 2.2. Laramie County 2010 Demographic and Social Characteristics

Characteristic	Laramie County	City of Cheyenne	Town of Albin	Town of Burns	Town of Pine Bluffs
Gender/Age					
Male	50.0%	49.3%	50.8%	47.5%	51.0%
Female	50.0%	50.7%	49.2%	52.5%	49.0%
Under 5 years	7.3%	7.4%	13.8%	7.6%	5.7%
65 years and over	12.5%	13.6%	4.5%	18.6%	18.1%
Race/Ethnicity (one race)					
White	88.5%	87.4%	93.9%	94.7%	94.2%
American Indian/Alaska Native	1.0%	1.0%	0.6%	1.3%	0.9%
Asian	1.1%	1.2%	0.6%	0.0%	0.4%
Black or African American	2.5%	2.9%	0.0%	1.0%	0.2%
Hispanic or Latino (of any race)	13.1%	14.5%	34.3%	3.7%	11.1%
Education					
High school graduate or higher (among people age 25+)	91.7%	92.4%	80.7%	87.1%	89.1%

Source: U.S. Census Bureau, 2010, www.census.gov/

According to population projections by the Wyoming Department of Administration and Information Economic Analysis Division, Laramie County’s population is expected to reach 106,740 people by 2030. The Economic Analysis Division also performed population forecasts at the municipal level, shown in Table 2.3. According to the Economic Analysis Division, Laramie County’s population is expected to grow at roughly 1.04% per year between 2010 and 2030. This estimate is based on the average annual percent change estimates in Table 2.3. This is roughly equal to both the Economic Analysis Division’s growth rate forecast for all of Wyoming (1.045%) and to the World Bank’s population growth rate forecast for the U.S. (1.037%) from 2010 to 2030.

Table 2.3. Population Projections for Laramie County: 2010-2030

	2010	2015	2020	2025	2030
Laramie County	91,738	96,230	99,710	102,790	106,740
Average Annual Percent Change (over 5-year increments)		1.05%	1.04%	1.03%	1.04%
City of Cheyenne	59,466	62,378	64,634	66,630	69,191
Average Annual Percent Change (over 5-year increments)		1.05%	1.04%	1.03%	1.04%
Town of Albin	181	190	197	203	211
Average Annual Percent Change (over 5-year increments)		1.05%	1.04%	1.03%	1.04%
Town of Burns	301	316	327	337	350
Average Annual Percent Change (over 5-year increments)		1.05%	1.03%	1.03%	1.04%
Town of Pine Bluffs	1,129	1,184	1,227	1,265	1,314
Average Annual Percent Change (over 5-year increments)		1.05%	1.04%	1.03%	1.04%

Source: Wyoming Department of Administration and Information Economic Analysis Division

Future development in the City of Cheyenne will be based on the supply of available land. According to the updated PlanCheyenne Community Snapshot, “the approximately 2,260 acres of vacant and agricultural land could accommodate 3,257 new residential housing units, and more than 7.7 million square feet of business and industry (as currently zoned).” A little over half of the vacant land in the City is zoned for residential uses. The other half is zoned for business, industry, and heavy industry. Vacant land in the rest of the County is primarily zoned for agricultural and residential uses. The vacant land in the County could accommodate an estimated 16,755 new residents based on current zoning. Laramie County and the City of Cheyenne could potentially accommodate growth through infill and redevelopment rather than expanding existing urbanized areas.

Development is occurring in south Cheyenne in the Allison Basin. The City of Cheyenne has recognized that flood mitigation projects must be undertaken in this area to minimize the flood

risk to new development. Refer to **Appendix A Mitigation Actions** for more details on the future development plan for Allison Basin.

2.4 Government

The Board of Commissioners is the governing body for Laramie County. Each of the three members serves a four-year term. Laramie County Voters voted to have five Commissioners in the 2011 Election. In the 2012 voters will choose the two new commissioners to take office January 1, 2013. They will serve a two year term; eventually these two positions will become a four year term. They are elected from each of three districts, but by the County electorate as a whole. County government has very limited legislative power per state statute.

The City of Cheyenne's governing body is a Mayor-Council form of government. The nine City Council members and Mayor are elected at-large and serve four-year terms. Three Council members are elected from each of the three wards within the City. A Council president and vice president are elected from the Council members and serve one-year terms.

Albin, Burns, and Pine Bluffs are all governed by a Mayor and four Town Councilors.

2.5 Economy

Early economic endeavors in Laramie County included fur trapping and mining. Agriculture and cattle ranching later became economic cornerstones. According to the 2010 Census, the industries that employed the most people in Laramie County were educational services, health care, and social assistance (21.6%); retail trade (13.6%); public administration (13.5%); arts, entertainment, recreation, accommodation, and food services (8.6%); and construction (7.3%). Although agriculture, forestry, hunting, fishing, and mining do not employ a large percentage of the Laramie County population today (only 3.1%), these industries are still an important part of the County's historic and present character. F.E. Warren Air Force Base, located in western Cheyenne, is also an important economic asset. The Base is Cheyenne's largest employer with roughly 4,200 military and civilian employees.

In spite of the U.S. economic downturn that began in 2008, economic growth has continued in Laramie County largely due to energy exploration and development. The oil industry in particular has expanded its presence in the County after pilot wells proved to be successful. Oil companies have begun buying land in the County with plans to expand drilling operations. This trend could create jobs in Laramie County, though the effects may not be immediately apparent. The growth of the oil industry has raised concerns about environmental impacts. This is discussed further in the hazardous materials section of **Chapter 4 Risk Assessment**.

Select economic characteristics for Laramie County from the 2010 Census are shown in Table 2.4.

Table 2.4. Laramie County Economic Characteristics

Characteristic	Laramie County	City of Cheyenne	Town of Albin	Town of Burns	Town of Pine Bluffs
Families below poverty level	6.7%	6.4%	8.7%	0.0%	5.2%
Individuals below poverty level	9.6%	9.3%	15.7%	3.1%	8.3%
Median home value, 2006-2010	\$169,900	\$165,300	\$85,000	\$119,300	\$122,500
Median household income	\$52,824	\$50,535	\$31,923	\$41,429	\$42,179
Per capita income	\$27,406	\$27,107	\$23,275	\$18,856	\$27,036
Population in labor force	49,453	31,693	54	189	517
Population employed	44,165	28,703	52	186	492
Unemployment	3.4%	3.4%	2.3%	1.0%	3.2%

Source: U.S. Census Bureau (2010), www.census.gov/

2.6 Building Inventory and Assets

In addition to people, structures, critical facilities and infrastructure, and other important assets in Laramie County are potentially exposed to hazards identified in this plan. Table 2.5 summarizes the property inventory for the County and each participating jurisdiction, based on improvement value (i.e. structures) and includes the building count and value grouped by parcel type and jurisdiction. This is an assessment of the overall property exposed within the County and by jurisdiction. Building value information in this table is based on data from the County assessor. Contents values are estimated as a percentage of the structure values using FEMA estimation factors for various occupancy classes (i.e. residential contents are estimated at 50% of the structure value; commercial contents are 100% of the structure value).

Table 2.5. Laramie County Building Inventory and Value by Jurisdiction

Jurisdiction	Occupancy Type*	Building Count**	Improved Parcel Count	Building Improved Market Value	Content Value Estimate	Total Value
Albin	Commercial	9	12	\$342,905	\$342,905	\$685,810
	Multi-Use	2	3	\$358,832	\$358,832	\$717,664
	Residential	63	67	\$3,184,044	\$1,592,022	\$4,776,066
	Total	74	82	\$3,885,781	\$2,293,759	\$6,179,540
Burns	Agricultural	6	6	\$760,228	\$760,228	\$1,520,456
	Commercial	14	13	\$988,984	\$988,984	\$1,977,968

Jurisdiction	Occupancy Type*	Building Count**	Improved Parcel Count	Building Improved Market Value	Content Value Estimate	Total Value
	Multi-Use	3	2	\$211,504	\$211,504	\$423,008
	Residential	134	127	\$10,129,153	\$5,064,577	\$15,193,730
	Total	157	148	\$12,089,869	\$7,025,293	\$19,115,162
Cheyenne	Commercial	1,985	1,341	\$782,549,988	\$782,549,988	\$1,565,099,976
	Industrial	45	48	\$59,220,739	\$88,831,109	\$148,051,848
	Multi-Use	1,767	793	\$220,137,640	\$220,137,640	\$440,275,280
	Residential	19,826	19,746	\$2,732,879,365	\$1,366,439,683	\$4,099,319,048
	Total	23,623	21,928	\$3,794,787,732	\$2,457,958,419	\$6,252,746,151
Pine Bluffs	Agricultural	4	4	\$181,767	\$181,767	\$363,534
	Commercial	91	77	\$8,585,737	\$8,585,737	\$17,171,474
	Industrial	2	2	\$343,418	\$515,127	\$858,545
	Multi-Use	16	5	\$720,014	\$720,014	\$1,440,028
	Residential	457	450	\$44,919,007	\$22,459,504	\$67,378,511
Total	570	538	\$54,749,943	\$32,462,149	\$87,212,092	
Unincorporated	Agricultural	1,156	921	\$112,498,746	\$112,498,746	\$224,997,492
	Commercial	2,669	539	\$150,995,643	\$150,995,643	\$301,991,286
	Exempt	18	2	\$584,587	\$584,587	\$1,169,174
	Industrial	59	23	\$439,907,847	\$659,861,771	\$1,099,769,618
	Multi-Use	75	36	\$6,241,109	\$6,241,109	\$12,482,218
	Residential	8,150	8,038	\$1,420,917,596	\$710,458,798	\$2,131,376,394
Total	12,127	9,559	\$2,131,145,528	\$1,640,640,654	\$3,771,786,182	
Grand Total	36,551	32,255	\$5,996,658,853	\$4,140,380,273	\$10,137,039,126	

*Commercial includes manufactured housing parks in the assessor's data.

**Based on address point file provided by County GIS.

Critical Facilities, Infrastructure, and Other Important Community Assets

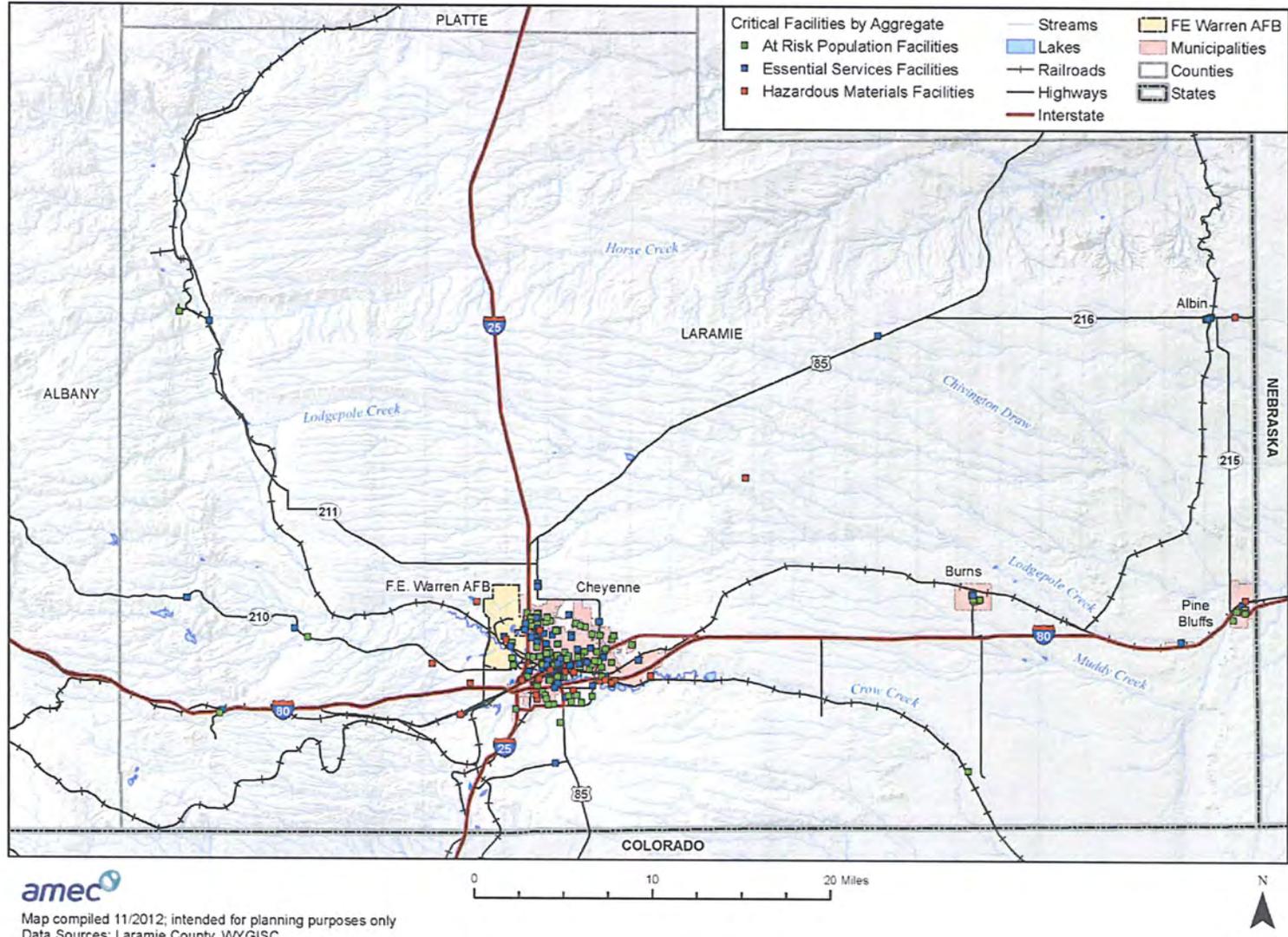
A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. Table 2.6 displays the aggregated inventory of critical facilities in Laramie County aggregated by categories that include at-risk population facilities, essential facilities, and hazardous materials facilities. Appendix F contains a detailed list of critical facilities broken out by name, community, and facility type. Figure 2.2 through Figure 2.6 depict the location of critical facilities in each of the participating jurisdictions.

Table 2.6. Laramie County Critical Facilities by Function

Aggregate	Classification	Total
At Risk Population Facilities	Childcare*	8
	Community Center	2
	Elderly Facilities	7
	Preschool	14
	Schools	74
	Schools - Bus Depot	1
	Total	106
Essential Services Facilities	Airports	2
	Emergency Management/EOC	1
	Fire Stations	26
	Government Buildings	31
	Government Buildings - Emergency Medical	1
	Government Buildings - Power Plant	1
	Government Buildings - Transportation Center	1
	Government Buildings - Health Admin	2
	Healthcare Facilities	12
	Hospitals	4
	Law Enforcement	6
	Utilities - Water Tank	1
Total	88	
Hazmat Facilities	Hazardous Materials Facilities	24
	Total	24
Grand Total		218

* Does not include in-home child care. There are 133 in-home child care facilities in Laramie County.

Figure 2.2. Laramie County Critical Facilities



amec
 Map compiled 11/2012; intended for planning purposes only
 Data Sources: Laramie County, WYGISC

Figure 2.3. City of Cheyenne Critical Facilities

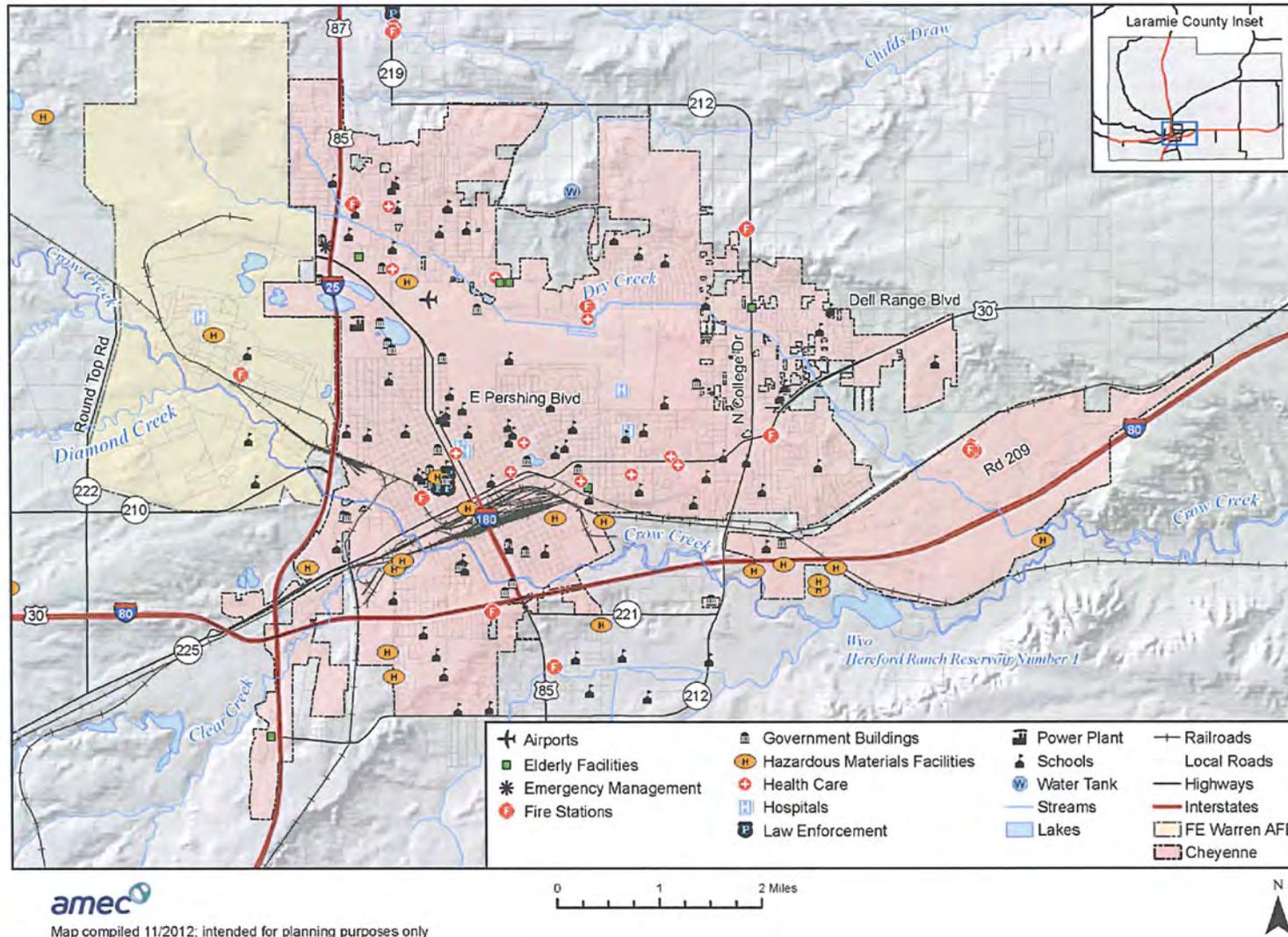
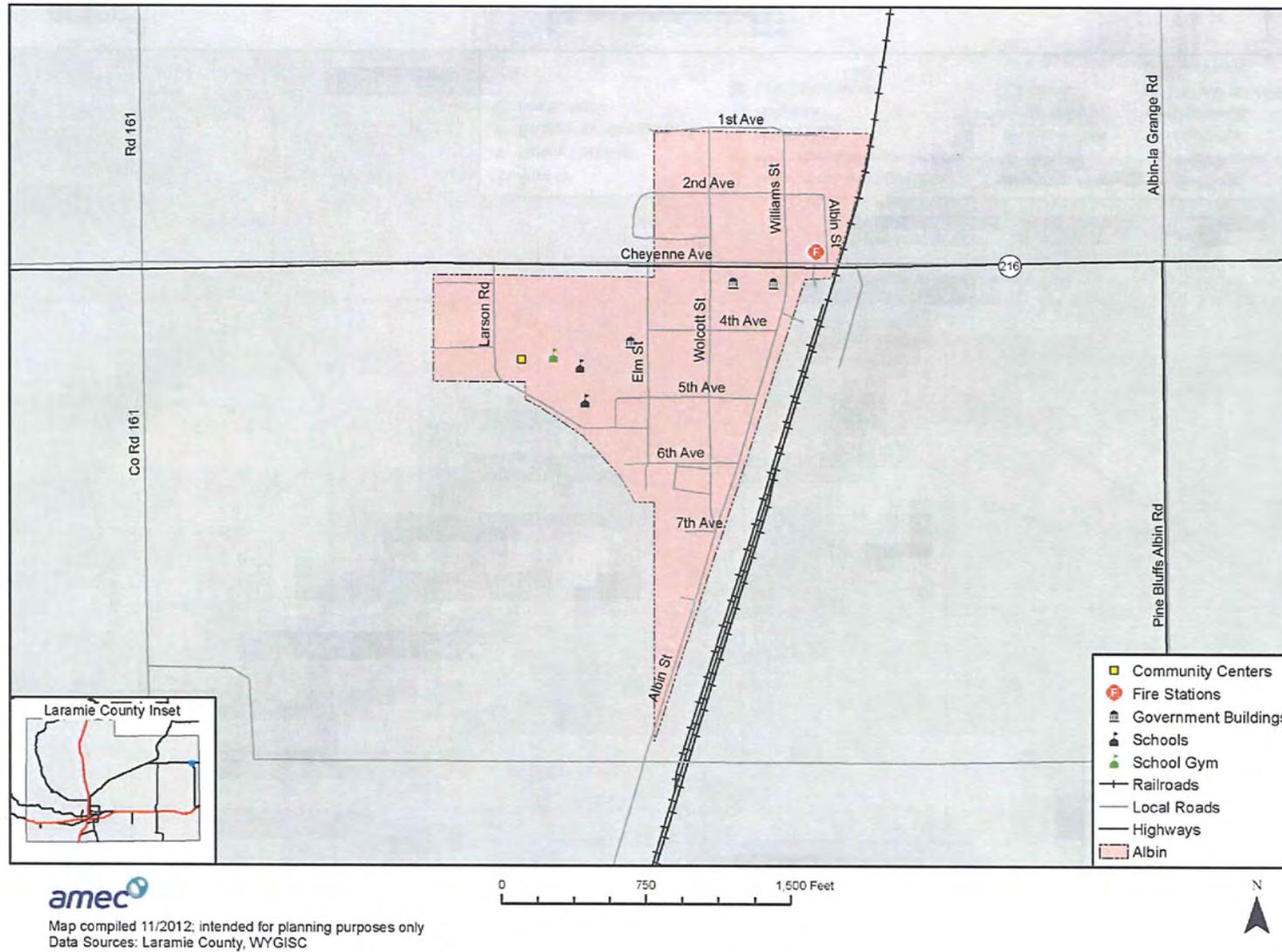


Figure 2.4. Town of Albin Critical Facilities



Map compiled 11/2012; intended for planning purposes only
 Data Sources: Laramie County, WYGISC

Figure 2.5. Town of Burns Critical Facilities

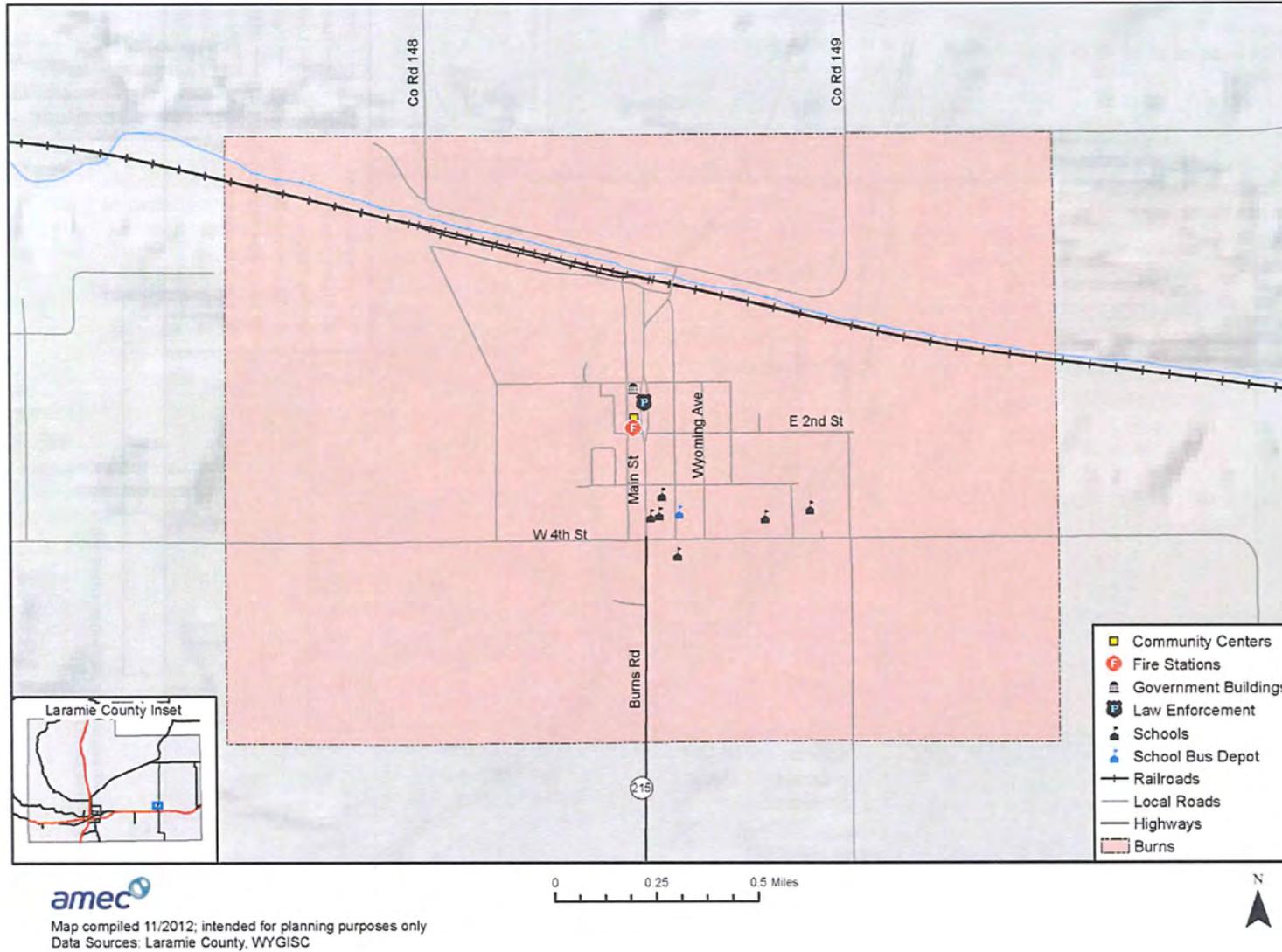
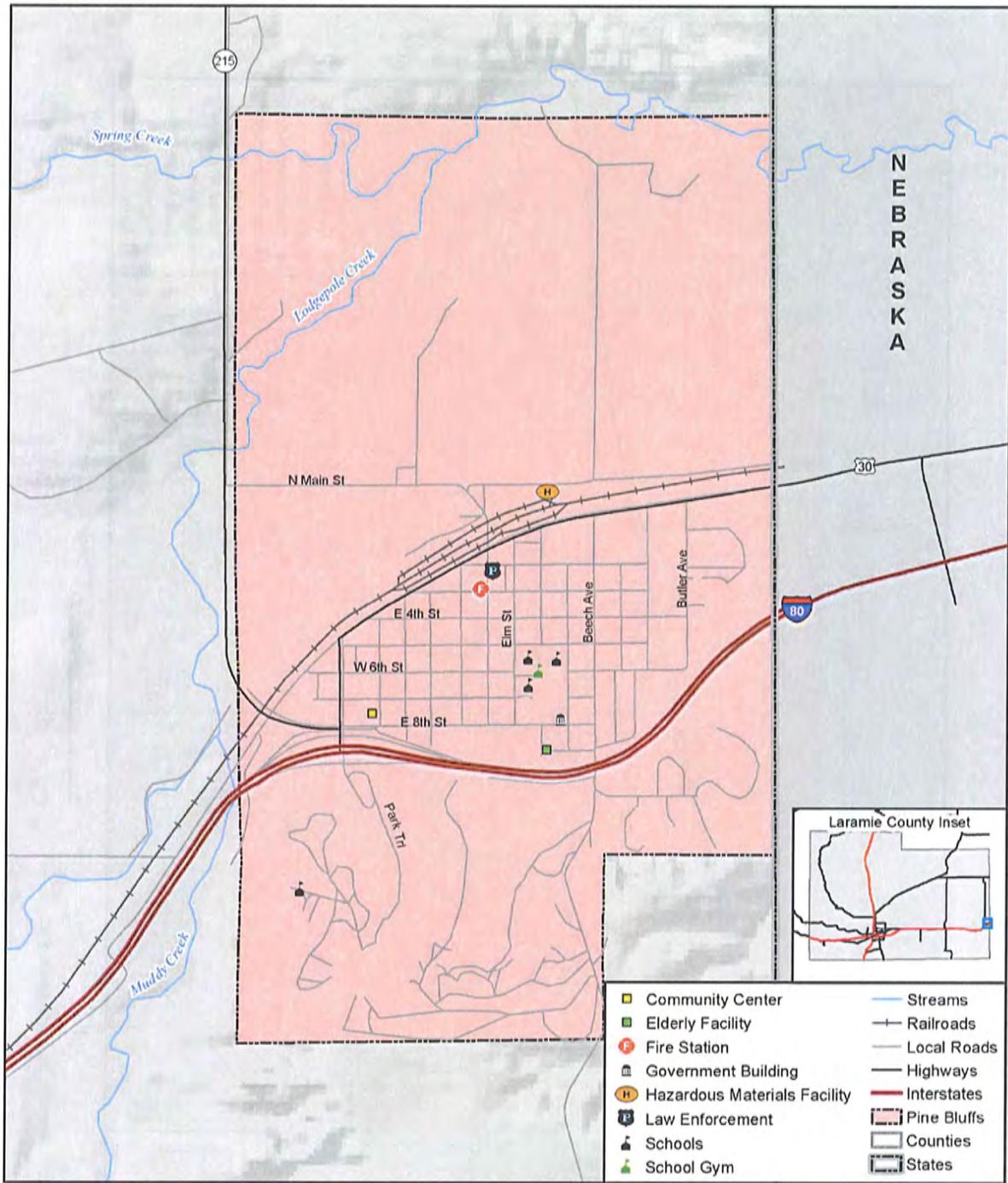


Figure 2.6. Town of Pine Bluffs Critical Facilities



0 0.5 1 Miles



Map compiled 11/2012; intended for planning purposes only
 Data Sources: Laramie County, WYGISC

Natural Assets

Assessing the vulnerability of Laramie County to disaster also includes developing an inventory of the natural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as attenuates and stores floodwaters.

A number of natural resources exist in Laramie County. This includes wetlands, endangered species, and imperiled plant communities. Also, the scenery itself, and access to the scenic backcountry, are economic drivers for the County and participating communities.

Wetlands

Wetlands are a valuable natural resource for communities, due to their benefits to water quality, wildlife protection, recreation, and education, and play an important role in hazard mitigation. Wetlands reduce flood peaks and slowly release floodwaters to downstream areas. When surface runoff is dampened, the erosive powers of the water are greatly diminished. Furthermore, the reduction in the velocity of inflowing water as it passes through a wetland helps remove sediment being transported by the water. They also provide drought relief in water-scarce areas where the relationship between water storage and streamflow regulation are vital.

Endangered Species

To further understand natural resources that may be particularly vulnerable to a hazard event, as well as those that need consideration when implementing mitigation activities, it is important to identify at-risk species (i.e., endangered species) in the planning area. An endangered species is any species of fish, plant life, or wildlife that is in danger of extinction throughout all or most of its range. A threatened species is a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Both endangered and threatened species are protected by law and any future hazard mitigation projects are subject to

these laws. Candidate species are plants and animals that have been proposed as endangered or threatened but are not currently listed.

As of August 2012, there are six federal endangered, threatened, or candidate species in Laramie County according to the U.S. Fish and Wildlife Service. These species are listed in Table 2.7.

Table 2.7. Endangered and Threatened Species in Laramie County

Common Name	Scientific Name	Type of Species	Status
Bald Eagle	<i>Haliaeetus Leucocephalus</i>	Bird	Recovery
Greater Sage-Grouse	<i>Centrocercus Urophasianus</i>	Bird	Candidate
Colorado Butterfly Plant	<i>Gaura neomexicana</i> var. <i>coloradensis</i>	Flowering Plant	Threatened
Ute Ladies'-Tresses	<i>Spiranthes diluvialis</i>	Flowering Plant	Threatened
Gray Wolf	<i>Canis lupis</i>	Mammal	Recovery
Preble's Meadow Jumping Mouse	<i>Zapus hudsonius preblei</i>	Mammal	Threatened

Source: <http://www.fws.gov/endangered/>

Historic Resources

Information about historic assets in Laramie County came from the combined Laramie County/City of Cheyenne GIS Department and the National Register of Historic Places. The **National Register of Historic Places** is the Nation's official list of cultural resources worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.

The National Register of Historic Places evaluates properties for inclusion in their databases using the National Register Criteria for Evaluation. The criteria examine the property's age, integrity, and significance. Generally, the property must be at least 50 years old, must look much the same way in the present as it did in the past, and must be associated with events, activities, people, or developments that were significant in the past. An historic property not only includes buildings of other types of structures, such as bridges and dams, but also includes prehistoric Native American sites, roads, byways, historic landscapes, and many other features. Given the history of the County, these types of historic properties exist in the planning area and are summarized in Appendix G.

2.7 Mitigation Capabilities Assessment

As part of the 2012 plan update process, the County and participating jurisdictions developed a mitigation capability assessment. Capabilities include plans, policies, and procedures that are currently in place that contribute to reducing hazard losses. Combining the risk assessment with

the mitigation capability assessment results in “net vulnerability” to disasters and more accurately focuses the goals, objectives, and proposed actions of this plan. The HMPC used a two-step approach to conduct this assessment. First, an inventory of common mitigation activities was made through the use of a questionnaire matrix. The purpose of this effort was to identify policies and programs that were either in place or could be undertaken, if appropriate. Second, the HMPC conducted an inventory and review of existing policies, regulations, plans, projects, and programs to determine if they contribute to reducing hazard related losses.

2.7.1 Laramie County Mitigation Capabilities

This section presents Laramie County’s mitigation capabilities as well as the capabilities of the City of Cheyenne, Town of Albin, Town of Burns, and the Town of Pine Bluffs that are applicable to the planning area. Mitigation capabilities for the Laramie County Fire Chiefs Association are also discussed due to the Association’s central role in wildland fire mitigation. This assessment describes existing capabilities, programs, and policies currently in use to reduce hazard impacts or capabilities that could be used to implement hazard mitigation activities. It addresses regulatory mitigation capabilities and administrative/technical mitigation capabilities for the participating jurisdictions.

Laramie County Regulatory Mitigation Capabilities

Table 2.8 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Laramie County. Excerpts from applicable policies, regulations, plans and programs descriptions follow to provide more detail on existing mitigation capabilities.

Table 2.8. Laramie County Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	In Place?	Comments
County Comprehensive Plan	Y	The 2001 Laramie County Comprehensive Plan is currently being updated by the Board of County Commissioners, the Planning Commission, the Planning and Development Office, and the University of Wyoming.
Zoning ordinance	Y	Cheyenne-Laramie County Zoning Ordinance first adopted in 1988; 2011 Laramie County Land Use Regulations Title 4, Chapter 1 and Chapter 2
Subdivision ordinance	Y	Cheyenne-Laramie County Subdivision/Development Regulations, 2000; 2011 Laramie County Land Use Regulations Title 2, Chapter 1
Growth management ordinance	N	No specific ordinance, but growth trends are discussed in the Comprehensive Plan
Floodplain ordinance	Y	2011 Laramie County Land Use Regulations Title 3, Chapter 3 and Chapter 4
Other special purpose ordinance (stormwater,	Y	2011 Laramie County Land Use Regulations Title 3,

Regulatory Tool (ordinances, codes, plans)	In Place?	Comments
steep slope, wildfire)		Chapter 1: Drainage and Stormwater Management
Building codes	Y	2006 International Code Council, 2008 National Electric Code, Resolutions adopting Electrical Code, Fuel and Gas Code, Plumbing Code, Fire Code, Mechanical Code, Residential Code, and Building Code
Fire department ISO rating		Varies by department
Erosion or sediment control program	Y	2011 Laramie County Land Use Regulations Title 3, Chapter 2: Grading, Sediment, and Erosion Control
Stormwater management program	Y	2011 Laramie County Land Use Regulations Title 3, Chapter 1: Drainage and Stormwater Management
Site plan review requirements	Y	2011 Laramie County Land Use Regulations Section 2-2-134
Capital improvements plan	N	
Economic development plan	N	
Local emergency operations plan	Y	Currently being updated
Other special plans		Energy Assurance Plan
Flood insurance study or other engineering study for streams	Y	"FIS for Laramie County, Wyoming, and Incorporated Areas" dated January 17, 2007
Elevation certificates (for floodplain development)	Y	Housed with Laramie County Planning and Development Office

Source: www.laramiecounty.com, HMPC

As indicated in the table above, Laramie County has several plans and programs that guide the County's mitigation of development in hazard-prone areas. Some of these plans and programs are described in more detail below.

Laramie County Comprehensive Plan, 2001

The Laramie County Comprehensive Plan serves as an advisory document to help guide both short- and long-term growth and development in the County. The overall goal of the plan is to promote the health, safety, and general welfare of Laramie County residents. The plan does not make strict resolutions for land use and development but rather offers preferred scenarios. The plan identifies several natural hazards in the County including flood, landslides, slope disturbances, wildland fire, seismicity, ground subsidence, and expansive soils. The Natural Hazards section of the plan provides guidance for developing in areas affected by these issues. Floodplains and geologic hazards are discussed the most extensively.

The County is in the process of updating the Comprehensive Plan. This effort is headed by the Board of Laramie County Commissioners, the Laramie County Planning Commission, and the Laramie County Planning and Development Office. Development in the County has changed greatly in the past 11 years. The growth of the oil and gas industry, for example, has and will continue to have a significant impact on the County in terms of land use, development, economic growth, and environmental concerns. The plan update group sought public input to ensure that

the plan aligns with the citizens' goals for the future of the County. The plan update group partnered with the University of Wyoming to assist with the natural resource component of the plan. University personnel also compared the plan update's goals and recommendations to those of other communities across the U.S. to evaluate the plan's effectiveness and sustainability.

Laramie County Land Use Regulations, 2011

Whereas the Comprehensive Plan provides general guidelines for land use in Laramie County, the Land Use Regulations document the resolutions, standards, and procedures for building and development. The purpose of the 2011 Laramie County Land Use Regulations is to provide for the safety of residents, economic vitality of the County, protection of natural resources, and orderly development of land. The Land Use Regulations state specific restrictions to development, including the presence of floodplains or unsuitable soils. The Land Use Regulations include a chapter on drainage and stormwater management. The Regulations provide strict parameters for drainage design, which include taking flood magnitudes and frequencies into account. The Land Use Regulations also cover sediment and erosion control and floodplain management.

Laramie County Administrative and Technical Mitigation Capabilities

Table 2.9 identifies the County personnel responsible for activities related to mitigation and loss prevention in Laramie County.

Table 2.9. Laramie County Administrative/Technical Mitigation Capabilities

Personnel Resources	In Place?	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Y	Planning and Development Office	
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Y	Planning and Development Office	
Planner/engineer/scientist with an understanding of natural hazards	N		
Personnel skilled in GIS	Y	GIS Department	
Full time building official	Y	Planning and Development Office	
Floodplain manager	Y	Laramie County Director of Public Works	Established by Land Use Regulations Section 3-3-112
Emergency manager	Y	Emergency Manager	
Grant writer	Y	Grants Department	

Personnel Resources	In Place?	Department/Position	Comments
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Y	GIS Department	Flood, storm sewer locations, address points, zoning maps
Warning Systems/Services	Y	Emergency Management	Outdoor warning system

The following departments are involved in hazard mitigation in Laramie County:

Planning and Development Office

The Laramie County Planning and Development Office is composed of the Planning and Building units. Planning staff reviews development proposals, administers the Planning Commission, executes special projects such as updating land use regulations, assists with zoning and subdivisions regulations, and helps implement plans that guide development and land use in Laramie County. The Building staff ensures that structures are built to appropriate codes and resolutions. The Building staff is responsible for issuing building permits in the County. The Planning and Development Office actively monitors the growth of the oil and gas industry in the County.

Emergency Management Agency

The Emergency Management Agency (EMA) serves all of Laramie County. The Department is responsible for maintaining and exercising the County's Emergency Operations Plan, as well as providing training and exercises in emergency management. EMA is also charged with maintaining the County's hazard mitigation plan and served as the lead during the 2012 HMP update process. EMA manages resources received from local, state, and private sources, and facilitates mutual aid agreements or intergovernmental agreements between agencies and jurisdictions. They are responsible for the County's outdoor warning system and serves as the leader for the Local Emergency Planning Committee (LEPC).

EMA also helps coordinate the Community Emergency Response Team (CERT) program as well as the amateur ham radio groups known as Amateur Radio Emergency Service (ARES) and Radio Amateur Civil Emergency Service (RACES). ARES/RACES consist of volunteers who assist with communications during disasters and emergencies. ARES/RACES members provide important communications services to first responders; when other forms of communication cease to work, ham radio may still be viable. Redundancy of communications is vital to any disaster or emergency operation.

The CERT program trains Laramie County citizens in basic disaster response. CERT members can assist professional emergency responders during disasters and emergencies. They can also

help raise awareness of disaster preparedness and response among their fellow citizens, helping the County to become more resilient to disasters and emergencies.

Cheyenne and Laramie County Cooperative Geographic Information Systems (GIS) Program

The Cheyenne and Laramie County Cooperative GIS Program was established in 1993 to organize and coordinate GIS efforts in the planning area. The GIS Program maintains the City and County's GIS system and databases. Their mapping services are used in the City and County's long-range planning and project site planning. Their datasets include flood hazards, address points, storm sewer locations, and zoning maps. These datasets and layers were used to determine the areas within the planning area that have the highest risk to certain natural hazards, which is discussed in Chapter 4 of this plan.

Planning Commission

The Planning Commission is responsible for reviewing land use development proposals. Proposals must align with the goals established in the Laramie County Comprehensive Plan. The Commission holds public hearings of proposals for new development including new subdivisions, zone changes, changes in regulations, and special projects. Development proposals must meet the criteria established in the Land Use Regulations in order to be approved. The Planning Commission makes recommendations for action based on land use regulations in Laramie County.

Grants Department

The Grants Department enables the County to undertake projects to improve the community, including the 2012 Combined Hazard Mitigation Plan Update. They work closely with the County Clerk's Finance Office to ensure that funds are spent wisely and within the applicable guidelines.

Public Works Department - Road and Bridge

The Road and Bridge Department is responsible for the repair, plowing, and maintenance of County roads within the planning area.

2.7.2 City of Cheyenne Mitigation Capabilities

City of Cheyenne Regulatory Mitigation Capabilities

Table 2.10 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the City of Cheyenne. Excerpts from applicable policies, regulations, plans, and program descriptions follow to provide more detail on existing mitigation capabilities.

Table 2.10. City of Cheyenne Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	In Place?	Comments
General or Comprehensive plan	Y	PlanCheyenne 2006 (in process of being updated)
Zoning ordinance	Y	Unified Development Code, Article 5 Zoning Regulations
Subdivision ordinance	Y	Unified Development Code, Article 4 Subdivision Regulations
Growth management ordinance	N	
Floodplain ordinance	Y	City of Cheyenne Floodplain Management Regulations
Other special purpose ordinance (stormwater, steep slope, wildfire)	Y	Unified Development Code, Article 3
Building code	Y	
Fire department ISO rating	Y	
Erosion or sediment control program	Y	Unified Development Code, Article 3
Stormwater management program	Y	Unified Development Code, Article 3
Site plan review requirements	Y	
Capital improvements plan	Y	
Economic development plan	Y	
Local emergency operations plan	Y	
Flood insurance study or other engineering study for streams	Y	"FIS for Laramie County, Wyoming, and Incorporated Areas" dated January 17, 2007
Elevation certificates (for floodplain development)	Y	On file with City of Cheyenne

As indicated in the table above, the City of Cheyenne has several plans and programs that guide the City's development. Some of the plans identified in Table 2.10 are described in more detail in the following paragraphs.

PlanCheyenne

The 2006 PlanCheyenne is currently being updated. PlanCheyenne serves as the master or comprehensive plan for the Cheyenne area. PlanCheyenne is divided into three sub-plans, including the Community Plan, the Parks and Recreation Master Plan, and the Transportation Master Plan. The Community Plan is most closely related to the Combined Laramie County

Multi-Hazard Mitigation Plan Update. The first section of the Community Plan, Snapshot, briefly details water, sewer, and stormwater in the Cheyenne area.

City of Cheyenne Unified Development Code, 2012

The City of Cheyenne Unified Development Code (UDC) establishes the resolutions, standards, and procedures for building and development in all incorporated areas of Cheyenne. The purposes of the UDC include promoting the health, safety, and general welfare of the citizens of Cheyenne; implementing PlanCheyenne and other official plans; promoting economic vitality; guiding coordinated development and land use; protecting historic properties; and establishing design and zoning standards. The UDC includes an extensive appendix on drainage standards.

Board of Public Utilities Water and Wastewater Master Plan, 2003

The Board of Public Utilities (BOPU) Water and Wastewater Master Plan consists of four separate books, each composed of two to four volumes. Book 1 of the BOPU Master Plan covers water supply and demand in the Board’s service area, including issues such as future capacity requirements and raw water supply and delivery. Book 1 includes a drought risk assessment and makes several recommendations for the development and management of the supply of raw water and groundwater. Book 1 recommendations contain both structural and non-structural projects to protect or increase water supply. Non-structural recommendations include the development of a water conservation plan and monitoring and assessment of wellfields and aquifers. Structural project recommendations include increasing reservoir storage, replacing and rehabilitating wells, examining possibilities for wastewater reuse, and developing aquifers. Book 2 primarily focuses on water quality and recommends projects for improving water quality and the water distribution system. Book 3 examines non-potable water distribution and wastewater collection, treatment, and reuse. Book 4 discusses the administrative side of BOPU, detailing the Board’s organizational structure and financial plan. For the 2012 Plan Update, BOPU submitted several mitigation projects that would implement some of the recommendations made in the 2003 BOPU Master Plan. These projects are discussed in further detail in Chapter 5 and Appendix A.2.

City of Cheyenne Administrative and Technical Mitigation Capabilities

Table 2.11 identifies the City personnel responsible for activities related to mitigation and loss prevention in the City of Cheyenne.

Table 2.11. City of Cheyenne Administrative/Technical Mitigation Capabilities

Personnel Resources	In Place?	Department/Position
Planner/engineer with knowledge of land development/land management practices	Y	Engineering

Personnel Resources	In Place?	Department/Position
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Y	Engineering
Planner/engineer/scientist with an understanding of natural hazards	Y	Engineering
Personnel skilled in GIS	Y	Engineering/Cheyenne and Laramie County Cooperative GIS Program
Full time building official	Y	Engineering
Floodplain manager	Y	Engineering
Emergency manager	Y	Laramie County Emergency Management
Grant writer	Y	
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Y	Engineering/Cheyenne and Laramie County Cooperative GIS Program
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)	Y	Outdoor warning system run by Laramie County Emergency Management

The following departments are involved in hazard mitigation in the City of Cheyenne:

Engineering Department

The City of Cheyenne Engineering Department plays a central role in hazard mitigation. The Engineering Department provides several services, including construction plan review, engineering services, traffic services, GIS mapping, city construction services, and floodplain management. The Engineering Department plans and executes numerous flood hazard mitigation projects in the City. These projects have drastically decreased the severity of the flood risk in Cheyenne since the 1985 flood.

Board of Public Utilities

The Board of Public Utilities (BOPU) manages the City's water and wastewater systems. BOPU manages water quality and water conservation efforts, playing an important role in drought mitigation. BOPU currently has a project to create a new water reuse and distribution system. The water reuse project would decrease demand for treated water for irrigation. This project is discussed in further detail in **Chapter 5** and **Appendix A**.

Planning and Development

The Planning and Development Department is composed of the Urban Planning Division, Development Services Division, Metropolitan Planning Organization, and Building Safety Division. The Planning and Development Department plays a key role in the development and implementation of the City's comprehensive plan and land use codes. The individual divisions within the department are responsible for guiding land use, enforcing building codes, short- and long-term planning, historic preservation, and reviewing development proposals.

Planning Commission

The Planning Commission conducts hearings for proposed development actions. After reviewing an application, the Planning Commission makes recommendations to the City Council. Seven citizens serve on the Planning Commission. The Planning Commission assists with the preparation of the City's comprehensive plan, PlanCheyenne. The Commission works closely with the Planning and Development Department to create land development regulations.

Public Works – Street and Alley Maintenance

The Public Works Street and Alley Division is responsible for the repair, plowing, and maintenance of 300 miles of City streets and alleys. The Division also maintains stormwater facilities to minimize flooding in the streets from storm events.

2.7.3 Town of Albin Mitigation Capabilities

Town of Albin Regulatory Mitigation Capabilities

The Town of Albin has several regulatory plans and projects related to hazard mitigation. Table 2.12 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the Town of Albin. Excerpts from applicable policies, regulations, plans, and program descriptions follow to provide more detail on existing mitigation capabilities.

Table 2.12. Town of Albin Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	In Place?	Comments
General or Comprehensive plan	N	
Zoning ordinance	N	
Subdivision ordinance	Y	
Growth management ordinance	N	
Floodplain ordinance	N	

Regulatory Tool (ordinances, codes, plans)	In Place?	Comments
Building code	N	
Fire department ISO rating	Y	
Erosion or sediment control program	N	
Stormwater management program	N	
Site plan review requirements	Y	
Capital improvements plan	N	
Economic development plan	Y	
Local emergency operations plan	Y	
Flood insurance study or other engineering study for streams	Y	Covered by the "FIS for Laramie County, Wyoming, and Incorporated Areas" dated January 17, 2007
Elevation certificates (for floodplain development)	N	
Other		

As indicated in the table above, the Town of Albin has a few plans and programs that guide the Town's mitigation of development in hazard-prone areas. County level plans that cover the Town of Albin are discussed in *Section 2.7.1 Laramie County Mitigation Capabilities*.

Town of Albin Administrative and Technical Mitigation Capabilities

The Town of Albin does not have any personnel responsible for activities related to hazard mitigation and loss prevention. Albin relies on Laramie County resources for these functions. County departments with a role in hazard mitigation are summarized in Section 2.7.1.

2.7.4 Town of Burns Mitigation Capabilities

Town of Burns Regulatory Mitigation Capabilities

Table 2.13 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the Town of Burns. Excerpts from applicable policies, regulations, plans, and program descriptions follow to provide more detail on existing mitigation capabilities.

Table 2.13. Town of Burns Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	In Place?		Comments
General or Comprehensive plan	Y	In need of update	
Zoning ordinance	Y	In need of update	
Subdivision ordinance	Y	In need of update	
Growth management ordinance	Y	In need of update	
Floodplain ordinance	Y	In need of update	
Building code	Y	In need of update	
Fire department ISO rating	Y	In need of update	
Erosion or sediment control program	Y	In need of update	
Stormwater management program	Y	In need of update	
Site plan review requirements	Y	In need of update	
Capital improvements plan	Y	In need of update	
Economic development plan	Y	In need of update	
Local emergency operations plan	Y	In need of update	
Flood insurance study or other engineering study for streams	Y	Covered by the "FIS for Laramie County, Wyoming, and Incorporated Areas" dated January 17, 2007	
Elevation certificates (for floodplain development)	Y	In need of update	
Other			

County level plans that cover the Town of Burns are discussed in *Section 2.7.1 Laramie County Mitigation Capabilities*.

Town of Burns Administrative and Technical Mitigation Capabilities

Table 2.14 identifies the Town personnel responsible for activities related to mitigation and loss prevention in the Town of Burns.

Table 2.14. Town of Burns Administrative/Technical Mitigation Capabilities

Personnel Resources	In Place?	Department/Position
Planner/engineer with knowledge of land development/land management practices	Y	Town-selected engineering company

Personnel Resources	In Place?	Department/Position
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Y	Town-selected engineering company
Planner/engineer/scientist with an understanding of natural hazards	Y	Town-selected engineering company
Personnel skilled in GIS	Y	Laramie County
Full time building official	N	Part-time, appointed by Mayor
Floodplain manager	Y	Laramie County
Emergency manager	Y	Part-time, appointed by Mayor
Grant writer	Y	Mayor, Town Clerk
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	Y	Laramie County
Warning Systems/Services	Y	Laramie County

The following departments are involved in hazard mitigation in the Town of Burns:

Town Council

The Town Council serves as the governing body of Burns. It is composed of the Mayor and four Town Councilors.

Utility Board

The Burns Utility Board oversees all utilities in the Town, including electricity, water, and sewer. The Board's function is to ensure that the citizens of Burns have access to reasonably priced, reliable, and safe utilities.

Maintenance Department

The Burns Maintenance Department is responsible for maintaining streets and roads in the Town. The Maintenance Department is charged with snow plowing, and may be called upon to help clear roadways for emergency services personnel during a disaster or emergency.

Town Emergency Manager

The Burns Emergency Manager oversees policy and operations related to disaster preparedness, prevention, mitigation, response, and recovery. They will act as the Emergency Operations Center coordinator during a disaster or emergency. The Emergency Manager may be in charge of developing the Town's Emergency Operations Plan or other local level emergency plans.

2.7.5 Town of Pine Bluffs Mitigation Capabilities

Town of Pine Bluffs Regulatory Mitigation Capabilities

Table 2.15 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the Town of Pine Bluffs. Excerpts from applicable policies, regulations, plans, and program descriptions follow to provide more detail on existing mitigation capabilities.

Table 2.15. Town of Pine Bluffs Regulatory Mitigation Capabilities Matrix

Regulatory Tool (ordinances, codes, plans)	In Place?	Comments
General or Comprehensive plan		
Zoning ordinance	N	
Subdivision ordinance	N	
Growth management ordinance	N	
Floodplain ordinance	Y	
Building code	Y	
Fire department ISO rating	5/9	
Erosion or sediment control program	N	
Stormwater management program	N	
Site plan review requirements		
Capital improvements plan		
Economic development plan		
Local emergency operations plan		
Flood insurance study or other engineering study for streams	Y	Covered by the "FIS for Laramie County, Wyoming, and Incorporated Areas" dated January 17, 2007
Elevation certificates (for floodplain development)		
Other		

County level plans that cover the Town of Pine Bluffs are discussed in *Section 2.7.1 Laramie County Mitigation Capabilities*.

Town of Pine Bluffs Administrative and Technical Mitigation Capabilities

Table 2.16 identifies the Town personnel responsible for activities related to mitigation and loss prevention in the Town of Pine Bluffs.

Table 2.16. Town of Pine Bluffs Administrative/Technical Mitigation Capabilities

Personnel Resources	In Place?	Department/Position
Planner/engineer with knowledge of land development/land management practices		Public Works Director
Engineer/professional trained in construction practices related to buildings and/or infrastructure	N	
Planner/engineer/scientist with an understanding of natural hazards	N	
Personnel skilled in GIS	N	
Full time building official	N	
Floodplain manager	N	
Emergency manager	N	
Grant writer		Town Administrator
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)	N	
Warning Systems/Services	N	

The following departments are involved in hazard mitigation in the Town of Pine Bluffs:

Public Works

The Pine Bluffs Public Works Department is responsible for the repair, plowing, and maintenance of roads within the Town.

2.7.6 Special Districts

Laramie County Fire Chiefs Association

The Laramie County Fire Chiefs Association consists of the fire chiefs of the nine fire districts in Laramie County. Figure 4.42 in Chapter 4 depicts the boundaries of each fire district in Laramie County. The fire districts play an important role in mitigating wildland fires in the County. The Fire Chiefs Association assisted with the development of the wildland fire hazard profile and risk assessment for the Plan Update.

Three of the fire districts were involved in the development of the Plan Update, including Laramie County Fire District (LCFD) 2, LCFD 8, and LCFD 10. The wildland fire risk is especially high in these three districts.

Laramie County Fire District 2 (LCFD2) is composed of over 80 volunteer firefighters. LCFD2 provides fire suppression, rescue, fire prevention, fire inspection, emergency medical services, disaster mitigation, and community outreach over a 1,000 square mile area in Laramie County. LCFD2 has three fire stations in their service area. LCFD2 offers community programs that teach residents how to mitigate their wildland fire risk.

Laramie County Fire District 8 (LCFD8) operates out of three fire stations. LCFD8 typically has 20 firefighters on average. The District serves roughly 2,000 residents over a 120 square mile area. LCFD8 has participated in a number of public education and safety programs such as FireWise and CPR classes. The District works with local subdivisions to organize and coordinate these programs.

Laramie County Fire District 10 (LCFD10) operates out of Harriman in western Laramie County. LCFD10 mails a quarterly information letter with tips on fire safety to local property owners. LCFD10 is working with the State Forestry Division to increase awareness and completion of defensible space plans for homeowners. The program has been active for roughly two years and needs to be accelerated. There are concerns of increased wildland fire vulnerability in the LCFD10 service area as more people move into the wildland urban interface (WUI). Mountain Bark Beetle has killed a high percentage of trees in western Laramie County, which could increase wildland fire risk. LCFD10 has a high elderly population and increased social vulnerability. Some elderly individuals may need additional assistance in the event of an evacuation.

2.7.7 Participation in National Flood Insurance Program

Laramie County, the City of Cheyenne, the Town of Burns, and the Town of Pine Bluffs all currently participate in the National Flood Insurance Program (NFIP). The NFIP allows private property owners to purchase affordable flood insurance and enables the community to retain its eligibility to receive certain federally backed monies and disaster relief funds. Laramie County joined the NFIP on May 21, 1980, the City of Cheyenne joined on September 30, 1977, the Town of Burns joined on January 13, 2008, and the Town of Pine Bluffs joined on May 1, 1986.

Laramie County and the City of Cheyenne also participate in the Community Rating System (CRS). The CRS is a voluntary program for NFIP-participating communities. It provides flood insurance discounts to policyholders in communities that provide extra measures of flood protection above the minimum NFIP requirements. Laramie County currently holds a CRS rating of Class 8, and the City of Cheyenne is rated at Class 7. The Class 8 rating provides a 10% flood insurance discount for policyholders within a special flood hazard area (SFHA) and a

5% discount for those outside of the SFHA. The Class 7 rating provides a 15% flood insurance discount for policyholders within a SFHA and a 5% discount for those outside of the SFHA.

The vulnerability assessment in *Section 4.2.6 Flood* includes greater detail on flood insurance coverage and claims for NFIP participant communities in Laramie County.

3 PLANNING PROCESS

Requirements §201.6(b) and §201.6(c)(1): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

- 1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;**
- 2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and**
- 3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.**

[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

3.1 Background on Mitigation Planning in Laramie County

The planning process and development of the Laramie County and City of Cheyenne hazard mitigation plans have their roots in meetings and activities that began in March 2001 and continued through 2005. The first versions of the two plans were approved by FEMA in 2005. Since the original development of the plans, FEMA guidance for local hazard mitigation plans has been refined and updated. These two plans were combined and underwent a major update in 2012 under the coordination of the Laramie County Emergency Management Agency (EMA) as part of the required five year update cycle. This update was necessary to conform to the latest FEMA guidance and improve the plans in general. Funding was secured through a FEMA Pre Disaster Mitigation planning grant to enable a consultant to be hired to facilitate the process and update the plan. Laramie County contracted with AMEC Environment and Infrastructure (AMEC) of Boulder, Colorado, for consulting services to update the plan that included a professional planner who oversaw the development of the plan. The development of the plan followed a structured planning process that involved various local government departments and other public and private stakeholders. The planning process is described further in this section and documented in Appendix B.

3.1.1 Plan Section Review and Analysis – 2012 Update

During the 2012 update process, the HMPC updated each section of the two previously approved plans to combine the plans, include new information, and improve the organization and formatting of the plans' contents. The HMPC and AMEC analyzed each section using FEMA's local plan update guidance (July 2008 Multi-Hazard Mitigation Planning Guidance and 2011 Local Mitigation Plan Review Tool and Guide) to ensure that the plan update met the latest requirements. The HMPC and AMEC determined that nearly every section of the 2005 plans

would need revision to align the plan update with the latest FEMA planning guidance and requirements. Thus, the 2012 plan update has been significantly revised from the 2005 versions.

Revisions included combining the 2005 plans and reorganizing the resulting document in a format that more closely follows the 2011 FEMA Local Mitigation Plan Review Tool. The 2012 plan update provided more detailed assessments of the hazards discussed in the 2005 plans. New GIS maps and methods were used to substantially improve the plan and quantify the loss potential to various hazards, where feasible.

The planning process section of the 2012 plan update enhanced the original planning process discussion in the 2005 plans. The step-by-step process used in the 2012 plan is very similar to that of the 2005 plans, though the 2012 process is organized to be more closely aligned with FEMA guidance. Notes of how various sections of the 2005 plans were improved or altered during the update are noted where appropriate in the narrative of the planning process that follows.

3.2 Local Government Participation

The Disaster Mitigation Act (DMA) planning regulations and guidance stress that each local government seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the Hazard Mitigation Planning Committee (HMPC),
- Detail areas within the planning area where the risk differs from that facing the entire area,
- Identify specific projects to be eligible for funding, and
- Have the governing board formally adopt the plan.

For the Combined Laramie County Mitigation and Strategy Plan Update's HMPC, "participation" meant:

- Attending and participating in the HMPC meetings;
- Establishing/reconvening a local steering committee;
- Providing available data requested of the HMPC;
- Providing/updating the hazard profile and vulnerability details specific to jurisdictions;
- Developing/updating the local mitigation strategy (action items and progress/status);
- Reviewing and providing comments on the plan drafts;
- Advertising, coordinating, and participating in the public input process; and
- Coordinating the formal adoption of the plan by the governing boards.

The Combined Laramie County Mitigation and Strategy Plan Update is a multi-jurisdictional plan that geographically covers everything within Laramie County's jurisdictional boundaries. Jurisdictions that participated in the 2005 Laramie County All-Hazard Mitigation Plan included the County, Town of Albin, Town of Burns, and Town of Pine Bluffs. The 2005 City of

Cheyenne Hazard Mitigation Plan covered only the City. Jurisdictions that fully participated in the update of this plan in 2012 by meeting the previous participation definition included unincorporated Laramie County, City of Cheyenne, Town of Albin, Town of Burns, and the Town of Pine Bluffs.

3.3 The 10-Step Planning Process

AMEC established the planning process for the Combined Laramie County Mitigation and Strategy Plan Update using the DMA planning requirements and FEMA’s associated guidance. This guidance is structured around a four-phase process:

- 1) Organize Resources
- 2) Assess Risks
- 3) Develop the Mitigation Plan
- 4) Implement the Plan and Monitor Progress

Into this four-phase process, AMEC integrated a more detailed 10-step planning process used for FEMA’s Community Rating System and Flood Mitigation Assistance programs. Thus, the modified 10-step process used for this plan meets the requirements of six major programs: FEMA’s Hazard Mitigation Grant Program, Pre-Disaster Mitigation program, Community Rating System (CRS), Flood Mitigation Assistance Program, Severe Repetitive Loss program, and new flood control projects authorized by the U.S. Army Corps of Engineers.

Table 3.1 shows how the modified 10-step process fits into FEMA’s four-phase process.

Table 3.1. FEMA’s Four-Phase Process and the 10-Step CRS Process Used to Develop Laramie County’s Local Hazard Mitigation Plan

FEMA’s 4-Phase DMA Process	Modified 10-Step CRS Process
1) Organize Resources	
201.6(c)(1)	1) Organize the Planning Effort
201.6(b)(1)	2) Involve the Public
201.6(b)(2) and (3)	3) Coordinate with Other Departments and Agencies
2) Assess Risks	
201.6(c)(2)(i)	4) Identify the Hazards
201.6(c)(2)(ii)	5) Assess the Risks
3) Develop the Mitigation Plan	
201.6(c)(3)(i)	6) Set Goals
201.6(c)(3)(ii)	7) Review Possible Activities
201.6(c)(3)(iii)	8) Draft an Action Plan

FEMA's 4-Phase DMA Process	Modified 10-Step CRS Process
4) Implement the Plan and Monitor Progress	
201.6(c)(5)	9) Adopt the Plan
201.6(c)(4)	10) Implement, Evaluate, and Revise the Plan

3.3.1 Phase 1: Organize Resources

Planning Step 1: Organize the Planning Effort

AMEC worked with the Laramie County EMA to establish the framework and organization for the development of this Plan. The Laramie County EMA took the lead on combining and updating the previous plans in 2012 and reconvening the HMPC. Efforts to reconvene the HMPC began in October of 2010 when Laramie County EMA requested and received letters of intent to participate from the leadership of each jurisdiction (Laramie County, the City of Cheyenne and the towns of Albin, Burns, and Pine Bluffs). In addition the City of Cheyenne passed a resolution authorizing the City's participation on September 12th, 2011. Laramie County EMA also held several meetings with the jurisdictions in 2010 (November 22, December 9 and 22), and 2011 (January 12 and 20, February 15, October 6, and December 2) prior to the engagement of the planning consultant in January 2012. Documentation of the letters of intent and meeting minutes are provided in Appendix B.

AMEC and the Laramie County Emergency Management Agency identified the key county, municipal, and other local government and initial stakeholder representatives. Letters of invitation were mailed to invite them to participate as a member of the HMPC and to attend a kickoff meeting. Representatives from the following County and municipal departments and special districts participated on the HMPC and the development of the plan:

Table 3.2. Combined Laramie County Hazard Mitigation Planning Committee

Laramie County	City of Cheyenne	Town of Albin	Town of Burns	Town of Pine Bluffs
Emergency Management	Board of Public Utilities	Town Council	Mayor	Police Department
Grants	Engineer's Office	Mayor	Fire Marshall	Town Administration
GIS	Fire and Rescue	Town Maintenance		Public Works/Utilities
Planning				
Public Works				
Combined Communications Center				
Fire Chiefs Assoc.				

A list of specific HMPC representatives is included in Appendix C. Other local, state, federal, and private stakeholders invited to participate in the HMPC are discussed under Planning Step 3.

During the planning process the HMPC communicated with a combination of face-to-face meetings, phone interviews, email correspondence, and an FTP (file transfer protocol) site. In addition to the 2010 and 2011 meetings, four primary planning meetings with the HMPC were held during the plan's update between February 2012 and January 2013. The meeting schedule and topics are listed in the following table. The kickoff meeting was held in the previous Laramie County EMA office in downtown Cheyenne. The other three meetings were held at the new Laramie County Emergency Operations Center (EOC) and were approximately 1.5 to 3 hours long. The sign-in sheets and agendas for each of the meetings are located in Appendix B.

Table 3.3. Schedule of HMPC Meetings

HMPC Meeting	Meeting Topic	Meeting Date
1	Introduction to DMA Planning/Kickoff Meeting	February 22, 2012
2	Risk Assessment Summary/Goals Update	May 30, 2012
3	Mitigation Strategy Update	July 11, 2012
4	Maintenance and Implementation Meeting	January 29, 2013

During the kickoff meeting, AMEC presented information on the scope and purpose of the plan, participation requirements of HMPC members, and the proposed project work plan and schedule. A plan for public involvement (Step 2) and coordination with other agencies and departments (Step 3) were discussed. AMEC also introduced preliminary hazard identification information for the county, and HMPC members refined the list of identified hazards. Participants were provided worksheets to facilitate the collection of information needed to support the plan, such as data on historic hazard events, values at risk, and current capabilities.

Planning Step 2: Involve the Public

The planning process was an open one, with the public informed and involved from the very beginning. Two public meetings were held as part of the planning process. The first was held on June 14th, 2012 at the Laramie County EOC in the City of Cheyenne in conjunction with the quarterly Local Emergency Planning Commission (LEPC) meeting. The second public meeting was held on October 25th, 2012 at the Laramie County EOC in conjunction with another quarterly LEPC meeting. Present at the public meetings were the Laramie County Emergency Management Agency, Laramie County Grants, the Town of Burns, the Town of Albin, the City of Cheyenne, Laramie County Planning, F.E. Warren Air Force Base, and several private and non-profit partners. Representatives from local oil and gas refineries attended the public meetings. Hazardous materials incidents are one of the most significant concerns in Laramie County, so participation from the refineries was highly valuable. Meeting attendees provided

input on historic hazard impacts, including flooding, winter storms, hail, high winds, and man-made hazards. Attendees also voiced concern about hazards outside of Laramie County that could impact local water supply, such as drought issues in neighboring Albany County.

Two survey forms were used to solicit feedback on the plan's hazards and gauge interest and support for potential mitigation strategies. Between the two public meetings, 9 forms were filled out and used to inform the draft plan. Based on the feedback from the public surveys the public felt that the highest priority mitigation actions should include upgrading emergency communication systems, public education/awareness, indoor/outdoor warning systems, tornado shelters, wildfire fuels treatment programs, stormwater drainage improvements, flood mitigation, critical facilities protection, continued NFIP participation, infrastructure hardening, wildland fire education and training, adoption of mutual aid agreements, and planning/zoning regulations. Survey respondents were invited to comment on the most important mitigation strategies listed in the plan. Based on two survey respondents there was support for projects in Chapter 5 of this plan related to public education/awareness, installation of backup generators at the Albin Community Center, and the development of an oil and gas safety plan. A suggested action proposed on a survey for HMPC consideration was related to mitigating pine beetle kill reduction by removing dead trees.

The public was given an opportunity to review and comment on the draft plan before it was finalized. The public was given the month of October 2012 to review and provide comments. The draft plan was placed on the Laramie County, City of Cheyenne and Pine Bluffs websites. Hardcopies with feedback forms were made available at County Emergency Management, the Laramie County Library and the Burns Town Hall. Aside from the surveys, no additional public comment was received on the draft plan. Record of public advertisements, surveys with public input, and sign-in sheets are provided in Appendix B.

Planning Step 3: Coordinate with Other Departments and Agencies

Early in the planning process, the HMPC determined that data collection, mitigation strategy development, and plan approval would be greatly enhanced by inviting state and federal agencies and organizations to participate in the process. Based on their involvement in hazard mitigation activities, their role in land stewardship in the County or City, or their role in public safety, representatives from the following agencies were coordinated with during the update of this plan in 2012.

- American Medical Response
- American Red Cross
- Board of Public Utilities
- Cheyenne Fire and Rescue
- Cheyenne Light Fuel and Power
- Cheyenne Regional Medical Center
- Cheyenne/Laramie County GIS

-
- Cheyenne/Laramie County Health Department
 - Dyno Nobel
 - F.E. Warren Air Force Base
 - Frontier Refinery
 - High West Energy
 - Kaiser Francis
 - Laramie County ARES/RACES
 - Laramie County Emergency Management
 - Laramie County Information Technology
 - Laramie County Residents
 - Laramie County Sheriff's Department
 - National Weather Service
 - NCAR
 - Sinclair Pipeline
 - Southern Star Gas
 - Suncor Energy
 - U.S. Department of Homeland Security
 - Veterans Affairs Medical Center
 - Wal-Mart
 - Wal-Mart Distribution
 - Wyoming Air National Guard Emergency Management Agency
 - Wyoming Department of Health
 - Wyoming Department of Transportation
 - Wyoming Livestock Board
 - Wyoming National Guard

Many of these stakeholders participated in the process by attending HMPC meetings. Many of them also serve on the County LEPC and were present at a public meeting during the plan update. They were also given an opportunity to review and comment on the draft plan. The National Weather Service in the City of Cheyenne provided a summary of storm data and unusual weather phenomena that was integrated into the appropriate hazard profiles in Chapter 4 of this plan.

Other Community Planning Efforts and Hazard Mitigation Activities

Hazard mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability from natural hazards. As such, this plan was coordinated with, and builds off of, other related planning efforts that help reduce hazard losses. Laramie County uses a variety of comprehensive planning mechanisms, such as comprehensive plans and ordinances, to guide growth and development. Integrating existing planning efforts and mitigation policies and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other community programs. The development of

this plan incorporated information from the following existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions.

- 2012 City of Cheyenne Unified Development Code
- 2011 Laramie County Land Use Regulations
- 2011 Wyoming Multi-Hazard Mitigation Plan
- 2006 PlanCheyenne
- 2005 Laramie County Multi-Hazard Mitigation Plan
- 2005 City of Cheyenne Multi-Hazard Mitigation Plan
- 2005 City of Cheyenne Flood Hazard Mitigation Plan
- 2003 Board of Public Utilities Water and Wastewater Master Plan
- 2001 Laramie County Comprehensive Plan
- Cheyenne / Laramie County Emergency Response Plan

Other documents were reviewed and considered, as appropriate, during the collection of data to support Planning Steps 4 and 5, which include the hazard identification, vulnerability assessment, and capability assessment. A list of references is included in Appendix D.

3.3.2 Phase 2: Assess Risks

Planning Steps 4 and 5: Identify the Hazards and Assess the Risks

AMEC led the HMPC in a comprehensive research effort to identify and document all the hazards that have, or could, impact the planning area. Data collection worksheets were used in this effort to aid in determining hazards and vulnerabilities and where risk varies across the planning area. Where data permitted, Geographic Information Systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities. A more detailed description of the risk assessment process and the results are included in **Chapter 4 Risk Assessment**.

The HMPC conducted a capability assessment to review and document the planning area's current capabilities to mitigate risk and vulnerability from natural hazards. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the HMPC can assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. The capability assessment is included for each of the participating jurisdictions in **Chapter 2 Community Profile**.

3.3.3 Phase 3: Develop the Mitigation Plan

Planning Steps 6 and 7: Set Goals and Review Possible Activities

AMEC facilitated brainstorming and discussion sessions with the HMPC that described the purpose and the process of developing planning goals and objectives, a comprehensive range of

mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. This process and its results are described in greater detail in **Chapter 5 Mitigation Strategy**.

Planning Step 8: Draft an Action Plan

Based on input from the HMPC regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7, AMEC produced a complete first draft of the plan. This complete draft was posted for HMPC review and comment on the project FTP site. Other agencies were invited to comment on this draft as well. HMPC and agency comments were integrated into the second draft, which was advertised and distributed to collect public input and comments. AMEC integrated comments and issues from the public, as appropriate, along with additional internal review comments and produced a final draft for the Wyoming Office of Homeland Security and FEMA Region VIII to review and approve, contingent upon final adoption by the governing boards of each participating jurisdiction.

3.3.4 Phase 4: Implement the Plan and Monitor Progress

Planning Step 9: Adopt the Plan

In order to secure buy-in and officially implement the plan, the plan was adopted by the governing boards of each participating jurisdiction on the dates included in the adoption resolutions in **Appendix E Plan Adoption**.

Planning Step 10: Implement, Evaluate, and Revise the Plan

The true worth of any mitigation plan is in the effectiveness of its implementation. Up to this point in the planning process, all of the HMPC's efforts have been directed at researching data, coordinating input from participating entities, and developing appropriate mitigation actions. Each recommended action includes key descriptors, such as a lead manager and possible funding sources, to help initiate implementation. An overall implementation strategy is described in **Chapter 7 Plan Implementation and Maintenance**.

Finally, there are numerous organizations within Laramie County and the City of Cheyenne whose goals and interests interface with hazard mitigation. Coordination with these other planning efforts, as addressed in Planning Step 3, is paramount to the ongoing success of this plan and mitigation in Laramie County and is addressed further in Chapter 7. A plan update and maintenance schedule and a strategy for continued public involvement are also included in Chapter 7.

4 RISK ASSESSMENT

44 CFR Requirement 201.6(c)(2): [The plan shall include] a risk assessment that provides the factual basis for activities proposed in the strategy to reduce the losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

As defined by the Federal Emergency Management Agency (FEMA), risk is a combination of hazard, vulnerability, and exposure. “It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.”

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The process allows for a better understanding of a jurisdiction’s potential risk to natural hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

This risk assessment followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses* (2002), which breaks the assessment down to a four-step process:

- 1) Identify Hazards
- 2) Profile Hazard Events
- 3) Inventory Assets
- 4) Estimate Losses

Data collected through this process has been incorporated into the following sections of this chapter:

- **Section 4.1 Hazard Identification** identifies the hazards that threaten the planning area and describes why some hazards have been omitted from further consideration.
- **Section 4.2 Hazard Profiles** discusses the threat to the planning area and describes previous occurrences of hazard events, the likelihood of future occurrences, and the participating jurisdictions’ vulnerability to particular hazard events. This section also examines vulnerability, assessing the planning area’s total exposure to natural hazards, considering assets at risk, critical facilities, and future development trends.

While not required by FEMA, the HMPC also conducted a mitigation capability assessment, which inventoried existing mitigation activities and existing policies, regulation, and plans that pertain to mitigation and can affect net vulnerability. The findings from this undertaking are in **Section 2.7 Mitigation Capabilities Assessment**.

4.1 Hazard Identification

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type...of all natural hazards that can affect the jurisdiction.

The Hazard Mitigation Planning Committee (HMPC) conducted a hazard identification study to determine the hazards that threaten the planning area.

4.1.1 Results and Methodology

Using existing hazards data, plans from participating jurisdictions, and input gained through planning and public meetings, the HMPC agreed upon a list of hazards that could affect Laramie County and/or the City of Cheyenne. Hazards data from FEMA, the Wyoming Office of Homeland Security (including the 2011 State of Wyoming Multi-Hazard Mitigation Plan), the National Oceanic and Atmospheric Administration, the Spatial Hazard Events and Losses Database for the United States (SHELDUS), and many other sources were examined to assess the significance of these hazards to the planning area. The hazards evaluated in this plan include those that have occurred historically or have the potential to cause significant human and/or monetary losses in the future.

Both the City of Cheyenne and Laramie County developed hazard mitigation plans that were approved in 2005. In the 2005 City of Cheyenne Hazard Mitigation Plan, the city identified 24 hazards and ranked them according to frequency of occurrence, magnitude, warning time, and severity. The city did not profile all 24 identified hazards, choosing instead to focus on the most significant hazards in Cheyenne including wildfires, tornadoes, thunderstorms/lightning, hazardous materials, hail, flood, drought, earthquake, and severe winter storms. The 2005 Laramie County Hazard Mitigation Plan profiled drought, tornado, flood, hail, severe winter storms, high winds, man-made hazards, and wildland fire.

During the 2012 update process, the city and county decided to combine their hazard mitigation plans. This decision was made to consolidate a lot of similar hazard profile information that overlapped between the two plans. The county's overall risk assessment is discussed here in Chapter 4 and includes notes where the risk varies across jurisdictions. Key differences between the city and towns' risk assessments are summarized in jurisdictional annexes. During the kickoff meeting for the 2012 update process, the HMPC reexamined the previous lists of hazards and decided whether any new hazards should be included, previous hazards removed, or any significance ratings changed. The HMPC determined that avalanches do not pose much threat anywhere in the planning area and thus do not warrant inclusion in the 2012 plan update. Extreme heat was identified as a high ranking hazard for the county in 2005, but this typically relates to how extreme heat conditions exacerbate the impacts of drought. A dam failure profile was added to the 2012 HMP. The city and county evaluated the risk of dam failure in a hazard identification summary table in the 2005 plans but chose not to include a hazard profile due to its low priority ranking. Hail, windstorms, and severe winter storms were upgraded high ranking

hazards in both the county and the city in 2012. Extreme cold and dam failure were upgraded from low hazards to medium hazards for both jurisdictions. The final list of hazards identified and investigated for the 2012 Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan Update includes:

- Dam failure
- Drought
- Earthquake
- Extreme cold
- Flooding
- Hail
- Hazardous materials
- Lightning
- Wildland fire
- Windstorms
- Winter storms and blizzards

Members of the HMPC used a hazards worksheet to rate the significance of hazards that could potentially affect the participating jurisdictions. Significance was measured in general terms, focusing on key criteria such as the likelihood of the event, past occurrences, spatial extent, and damage and casualty potential. Table 4.1 represents the worksheet used to identify and rate the hazards and is a composite that includes input from all the participating jurisdictions. Note that the significance of the hazard may vary from jurisdiction to jurisdiction. The most significant hazards, based on the subjective input from the team, are listed alphabetically as drought, flooding, hail, hazardous materials, tornadoes, wildland fire, windstorms, and winter storms. Some modifications were made to the original HMPC input based on the results of this risk assessment.

Table 4.1 Laramie County Hazards Identification Worksheet

Hazard	Likelihood/ Frequency of Occurrence	Spatial Extent	Potential Magnitude	Significance
Dam Failure	Occasional	Significant	Critical	Medium
Drought	Likely	Extensive	Critical	High
Earthquake	Occasional	Significant	Limited	Medium
Extreme Cold	Likely	Extensive	Negligible	Medium
Flood	Likely	Significant	Catastrophic	High
Hailstorm	Highly Likely	Significant	Critical	High
Hazardous Materials	Highly Likely	Significant	Critical	High
Lightning	Likely	Limited	Limited	Low
Tornado	Likely	Significant	Catastrophic	High
Wildland fires	Highly Likely	Significant	Limited	High
Windstorm	Highly Likely	Extensive	Limited	High
Winter Storm and Blizzards	Highly Likely	Extensive	Critical	High

Likelihood of Event/Frequency

Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
 Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
 Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
 Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Hazard Extent

Limited: Less than 10% of planning area
 Significant: 10-50% of planning area
 Extensive: 50-100% of planning area

Potential Magnitude

Catastrophic: More than 50% of area affected
 Critical: 25-50% of area affected
 Limited: 10-25% of area affected
 Negligible: Less than 10% of area affected

Significance

Low: minimal potential impact
 Medium: moderate potential impact
 High: widespread potential impact

Although the identified hazards apply to the entire Laramie County planning area, some hazards have a greater impact on certain jurisdictions. Table 4.2 summarizes the significance of the hazards in each jurisdiction. The significance rankings are based on GIS analysis, data obtained during the risk assessment, and HMPC input obtained in the hazards worksheet. Hazard impacts by jurisdiction are differentiated in detail in the hazard profiles and the vulnerability assessments. Each hazard profile in **Section 4.2 Hazard Profiles** contains four subsections entitled *Geographical Area Affected*, *Likelihood/Frequency of Occurrence*, *Potential Magnitude*, and *Vulnerability Assessment*. The *Vulnerability Assessment* subsection examines how each hazard impacts population; property and economic losses; critical facilities and community assets; and natural, historic, and cultural resources. If a given hazard affects certain jurisdictions more frequently or severely than others, it is noted in these subsections. Maps and tables were developed where possible to illustrate the spatial extent and magnitude of identified hazards.

Table 4.2 Hazard Significance by Jurisdiction

Hazard	Laramie County	City of Cheyenne	Town of Albin	Town of Burns	Town of Pine Bluffs
Dam Failure	Medium	Medium	N/A	N/A	N/A
Drought	High	Medium	Medium	Medium	High
Earthquake	Medium	Medium	Medium	Medium	Medium
Extreme Cold	Medium	Medium	Medium	Medium	Medium
Flood	High	High	N/A	Low	Low
Hailstorm	High	High	High	High	High
Haz Mat	High	High	High	High	High
Lightning	Low	Low	Low	Low	Low
Tornado	High	High	High	High	High
Wildland fires	High	Low	Low	Medium	High
Windstorm	High	High	Medium	Medium	Medium
Winter Storms	High	High	High	High	High

Hazard Significance Color Code

- High = Widespread potential impact.
- Medium = Moderate potential impact.
- Low = Minimal potential impact.
- N/A = Not applicable. Jurisdiction not affected by hazard in question.

4.1.2 Disaster Declaration History

As part of the hazard identification process, the HMPC researched past events that triggered federal and/or state emergency or disaster declarations in the planning area. Federal and/or state disaster declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government’s capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments’ capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations. The quantity and types of damage are the determining factors.

A USDA declaration will result in the implementation of the Emergency Loan Program through the Farm Services Agency. This program enables eligible farmers and ranchers in the affected county as well as contiguous counties to apply for low interest loans. A USDA declaration will automatically follow a major disaster declaration for counties designated major disaster areas and those that are contiguous to declared counties, including those that are across state lines. As part of an agreement with the USDA, the SBA offers low interest loans for eligible businesses that suffer economic losses in declared and contiguous counties that have been declared by the USDA. These loans are referred to as Economic Injury Disaster Loans.

Table 4.3 provides information on federal emergencies and disasters declared in Wyoming between 1963 and 2011. Laramie County was included in six of the declared events including severe storms, droughts, and floods.

Table 4.3 Major Disaster Declarations in Wyoming: 1963 - 2011

Event/ Hazard	Year	Declaration Type	Remarks/Description
Heavy rains, flooding	1963	Presidential – Major Disaster Declaration	
Drought	1977	Presidential - Emergency Declaration	
Severe storms, flooding, mudslides	1978	Presidential – Major Disaster Declaration	
Severe storms, tornadoes*	1979	Presidential – Major Disaster Declaration	Included Laramie County
Severe storms, hail, flooding*	1985	Presidential – Major Disaster Declaration	Included Laramie County
Methane gas seepage	1987	Presidential - Emergency Declaration	
Severe winter storm	1999	Presidential – Major Disaster Declaration	
Dead Horse Fire	2000	Fire Mgmt Assistance Declaration	
Winter storm	2000	Presidential – Major Disaster Declaration	
Green Knoll Fire	2001	Fire Mgmt Assistance Declaration	
Elk Mountain #2 Fire	2001	Fire Mgmt Assistance Declaration	
McFarland Divide Fire	2001	Fire Mgmt Assistance Declaration	
Hensel Fire	2002	Fire Mgmt Assistance Declaration	
Reese Mountain Fire	2002	Fire Mgmt Assistance Declaration	
Commissary Ridge Fire	2002	Fire Mgmt Assistance Declaration	
Tongue River Fire	2003	Fire Mgmt Assistance Declaration	
Tornado	2005	Presidential – Major Disaster Declaration	
Drought	2006	USDA Declaration	Statewide drought
Thorn Divide Fire Complex	2006	Fire Mgmt Assistance Declaration	
Jackson Canyon Fire	2006	Fire Mgmt Assistance Declaration	
Drought*	2007	USDA Declaration	Statewide drought, Laramie County included as a contiguous county
Heavy rains, flooding, hail, and high winds*	2007	USDA Declaration	Laramie County included as a contiguous county
Little Goose Fire	2007	Fire Mgmt Assistance Declaration	
Drought	2009	USDA Declaration	
Severe freeze	2009	USDA Declaration	
Severe freeze	2010	USDA Declaration	

Event/ Hazard	Year	Declaration Type	Remarks/Description
Severe winter storms*	2010	USDA Declaration	Primary counties in Nebraska, Laramie County included as a contiguous county
Flooding	2010	Presidential – Major Disaster Declaration	Rain and snowmelt flooding in Fremont County and portions of the Wind River Reservation
Severe storms, flooding, and landslides	2011	Presidential – Major Disaster Declaration	

Sources: Public Entity Risk Institute Presidential Disaster Declaration Site, www.peripresdecusa.org/, 2011 Wyoming Multi-Hazard Mitigation Plan

*Impacted Laramie County

4.2 Hazard Profiles

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the...location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

The hazards identified in Section 4.1 Identifying Hazards are profiled individually in this section. Much of the profile information came from the same sources used to initially identify the hazards.

4.2.1 Profile Methodology

Each hazard is profiled in a similar format that is described below:

Hazard/Problem Description

This subsection gives a generic description of the hazard and associated problems, followed by details on the hazard specific to Laramie County.

Geographical Area Affected

This subsection discusses which areas of the county are most likely to be affected by a hazard event.

- **Limited:** Less than 10 percent of the planning area
- **Significant:** 10 to 50 percent of the planning area
- **Extensive:** 50 to 100 percent of the planning area

Past Occurrences

This subsection contains information on historic incidents, including impacts where known. The extent or location of the hazard within or near the Laramie County Planning Area is also

included here. Information provided by the HMPC is included here along with information from other data sources.

National Databases Used to Determine Past Occurrences

Two databases were used to assist in documenting past occurrences:

- The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database tracks severe weather events on a county basis and contains data on the following: all weather events from 1993 to current (except from 6/1993-7/1993); and additional data from the Storm Prediction Center, which includes tornadoes (1950-1992), thunderstorm winds (1955-1992), and hail (1955-1992). This database contains severe weather events that occurred in the planning area between January 1, 1950, and April 31, 2010.
- NCDC data was supplemented with data from SHELDUS (Spatial Hazard Events and Losses Database for the United States). SHELDUS is a county-level data set for the United States that tracks 18 types of natural hazard events along with associated property and crop losses, injuries, and fatalities for the period 1960-2005. Produced by the Hazards Research Lab at the University of South Carolina, this database combines information from several sources (including the NCDC). From 1960 to 1995, only those events that generated more than \$50,000 in damage were included in SHELDUS. For events that covered multiple counties, the dollar losses, deaths, and injuries were equally divided among the affected counties (e.g., if four counties were affected, then a quarter of the dollar losses, injuries, and deaths were attributed to each county). From 1995 to 2005, all events that were reported by the NCDC with a specific dollar amount are included in SHELDUS. SHELDUS contains information on severe weather events that occurred in the planning area between 1960 and 2010.

When available, tables showing county-specific data from the NCDC and SHELDUS databases may be found in each hazard profile.

Frequency/Likelihood of Occurrence

The frequency of past events is used in this section to gauge the likelihood of future occurrences. Based on historical data, the likelihood of future occurrences is categorized into one of the following classifications:

- **Highly Likely**—Near 100 percent chance of occurrence in next year, or happens every year.
- **Likely**—Between 10 and 100 percent chance of occurrence in next year, or has a recurrence interval of 10 years or less.
- **Occasional**—Between 1 and 10 percent chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
- **Unlikely**—Less than 1 percent chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

The frequency, or chance of occurrence, was calculated where possible based on existing data. Frequency was determined by dividing the number of events observed by the number of years and multiplying by 100. Stated mathematically, the methodology for calculating the probability of future occurrences is:

$$\frac{\text{\# of known events}}{\text{years of historic record}} \times 100$$

This gives the percent chance of the event happening in any given year. An example would be three droughts occurring over a 30-year period which equates to 10 percent chance of that hazard occurring any given year.

Potential Magnitude of Impacts

This subsection discusses the potential magnitude of impacts from a hazard event. Magnitude classifications are as follows:

Catastrophic—More than 50 percent of property severely damaged, and/or facilities are inoperable or closed for more than 30 days. More than 50 percent agricultural losses. Multiple fatalities and injuries. Critical indirect impacts.

Critical—25 to 50 percent of property severely damaged, and/or facilities are inoperable or closed for at least 2 weeks. 10-50 percent agricultural losses. Injuries and/or illnesses result in permanent disability and some fatalities. Moderate indirect impacts.

Limited—10 to 25 percent of area affected. Some injuries, complete shutdown of critical facilities for more than one week, more than 10 percent of property is severely damaged.

Negligible—Less than 10 percent of area affected. Minor injuries, minimal quality-of-life impact, shutdown of critical facilities and services for 24 hours or less, less than 10 percent of property is severely damaged.

Vulnerability Assessment

Vulnerability is the measurement of exposed structures or populations relative to the risk of the hazard. For most hazards, vulnerability is a best-estimate. Some hazards, such as flood, affect specific areas so that exposure can be quantified, and vulnerability assessments result in a more specific approximation. Other hazards, such as tornados, are so random and unpredictable in location and duration that only approximate methods can be applied.

This section provides an analysis of the exposed properties, people, and resources in the county specific to the hazard. This is a general picture that assesses common exposures for all hazards and combines the estimation of a hazard's occurrence probability with the associated vulnerabilities of critical infrastructure and populations. This section fulfills Section 2, Element

B of the FEMA Local Mitigation Plan Review Tool. For clarification and ease of mitigation planning, exposures are broken into four major categories:

- Population
- General Property
- Essential Infrastructure, Facilities, and Other Important Community Assets
- Natural, Historic and Cultural Resources

Summary

Each hazard profile concludes with a synopsis of the potential impacts in qualitative terms, and a summary of the probability of occurrence and jurisdictions most likely to be affected. If a hazard is not applicable to a given jurisdiction, it is noted in the summary section.

PROPERTY AFFECTED: High, Medium or Low

POPULATION AFFECTED: High, Medium or Low

PROBABILITY: Unlikely, Occasional, Likely, Highly Likely

JURISDICTION AFFECTED: County and/or Town/City

4.2.2 Dam Failure

Hazard/Problem Description

Dam Failure

Dams are man-made structures built for a variety of uses, including flood protection, power, agriculture, water supply, and recreation. Dams typically are constructed of earth, rock, concrete, or mine tailings. Dams and reservoirs serve a very important role for Wyoming residents and industry. Rarely, however, the dams fail, either completely or partially, and become a significant hazard for those downstream.

Two factors that influence the potential severity of a full or partial dam failure are the amount of water impounded and the density, type, and value of development and infrastructure located downstream.

Dam failures can result from any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding, which result in overtopping
- Earthquake
- Inadequate spillway capacity resulting in excess overtopping flows
- Internal erosion caused by embankment or foundation leakage or piping or rodent activity

- Improper design
- Improper maintenance
- Negligent operation
- Failure of upstream dams on the same waterway

Dam failure occurs when the retention function of the dam is compromised, in part or in its entirety. Damage to a dam structure that may result in a failure may be caused by many sources. Possible damages include poor maintenance, age, animal incursion (particularly in earthen dams), erosion, and damages sustained as a result of seismological activity. A dam failure is not the only type of emergency associated with dams. Spillway discharges that are large enough to cause flooding in downstream areas or flooding upstream of dams due to backwater effects or high pool levels are both considered dam emergencies and may cause significant property damage and loss of life.¹

Dam failures result in a unique source of flash flooding, when a large amount of previously detained water is suddenly released into a previously dry area due to a failure in some way of the dam. Dams are classified into three classes. The 2011 State of Wyoming Multi-Hazard Mitigation Plan defines Class I (High Hazard) dams as those rated based on an expected loss of human life, should the dam fail, and Class II (Significant Hazard) dams as those rated based on expected significant damage, but not loss of human life. Failure of a Class III (Low Hazard) dam would likely result in minimal property damage and no loss of life. Significant damage refers to structural damage where humans live, work, or recreate; or public or private facilities exclusive of unpaved roads and picnic areas. Damage refers to making the structures inhabitable or inoperable.²

Dam failure is the uncontrolled release of impounded water resulting in downstream flooding, which can affect life and property. Flooding, earthquakes, blockages, landslides, lack of maintenance, improper operation, poor construction, vandalism, or terrorism cause dam failures. Dam failures can be classified into four classifications: overtopping, foundation failure, structural failure, and other unforeseen failures. Overtopping failures result from the uncontrolled flow of water over, around, and adjacent to the dam. Earthen dams are most susceptible to this type of failure. Hydraulic failures account for approximately 28% of all dam failures. Foundation and structural failures are usually tied to seepage through the foundation of the main structure of the dam. Deformation of the foundation or settling of the embankment can also result in dam failure. Structural failures account for approximately 28% of all dam failures, and foundation problems account for another 25%. Earthquakes or sabotage account for 12% of all dam failures, while inadequate design and construction account for the remaining 7% of failures.

¹ US Army Corps of Engineers *Flood Emergency Plans: Guidelines for Corps Dams*. Hydrologic Engineering Center, (June 1980) p 4.

² Wyoming Office of Homeland Security, 2011 Wyoming Multi-Hazard Mitigation Plan, p. 4.1.

Geographical Area Affected

In 1981, the U.S. Army Corps of Engineers completed an inspection program for nonfederal dams under the National Dam Inspection Act (P.L. 92-367). This was a four-year work effort and included compiling an inventory of about 50,000 dams and conducting a review of each state's capabilities, practices, and regulations regarding design, construction, operation, and maintenance of dams. Part of the inspection included evaluating the dams and assigning a hazard potential based on the effects downstream should one of the dams fail. The dams were rated (1) high, (2) significant, and (3) low hazard. The Corps of Engineers based the hazard potential designation on such items as acre-feet capacity of the dam, distance from nearest community downstream, population density of the community, and age of the dam. High hazard dams would, in case of failure of the dam, likely cause loss of life. Significant hazard dams would, in case of failure, likely cause significant property damage, but no loss of life. Failure of a low hazard dam would likely cause only minimal property damage. Hazard potential classification is no guarantee of safety.

The Wyoming State Engineer's Office (SEO) inspects dams over 20 feet high or with a storage capacity of 50 acre-feet or more, although smaller dams are also regulated if the potential for failure indicates a need. In 2010, the SEO regulated 1,529 dams. 81 of these were rated high hazard, 110 were rated significant hazard, and 1,338 were rated low hazard. The SEO inspects these dams once every five years. Figure 4.1 illustrates the location and hazard ratings of dams in Laramie County. Laramie County has 35 dams that are inspected by the Wyoming State Engineer's Office, including five high hazard dams and seven significant hazard dams. The high hazard dams include Granite Springs, Crystal Lake, Upper Van Tassel (a.k.a. Upper North Crow), Carey Detention, and South Crow Diversion. Significant hazard dams in the county include Polaris, One Mile, Swan, Wyoming Hereford Ranch No. 1, Wyoming Hereford Ranch No. 1, Hirsig No. 4, and Lower North Crow. Cheyenne is the nearest downstream city for six of the eleven high or significant hazard dams in Laramie County. Table 4.4 summarizes the high and significant hazard dams that are located in, or could affect, the planning area. Note that according to the information in the table, none of these dams have emergency action plans (EAP). Dam failure would affect a **significant** portion of the planning area.

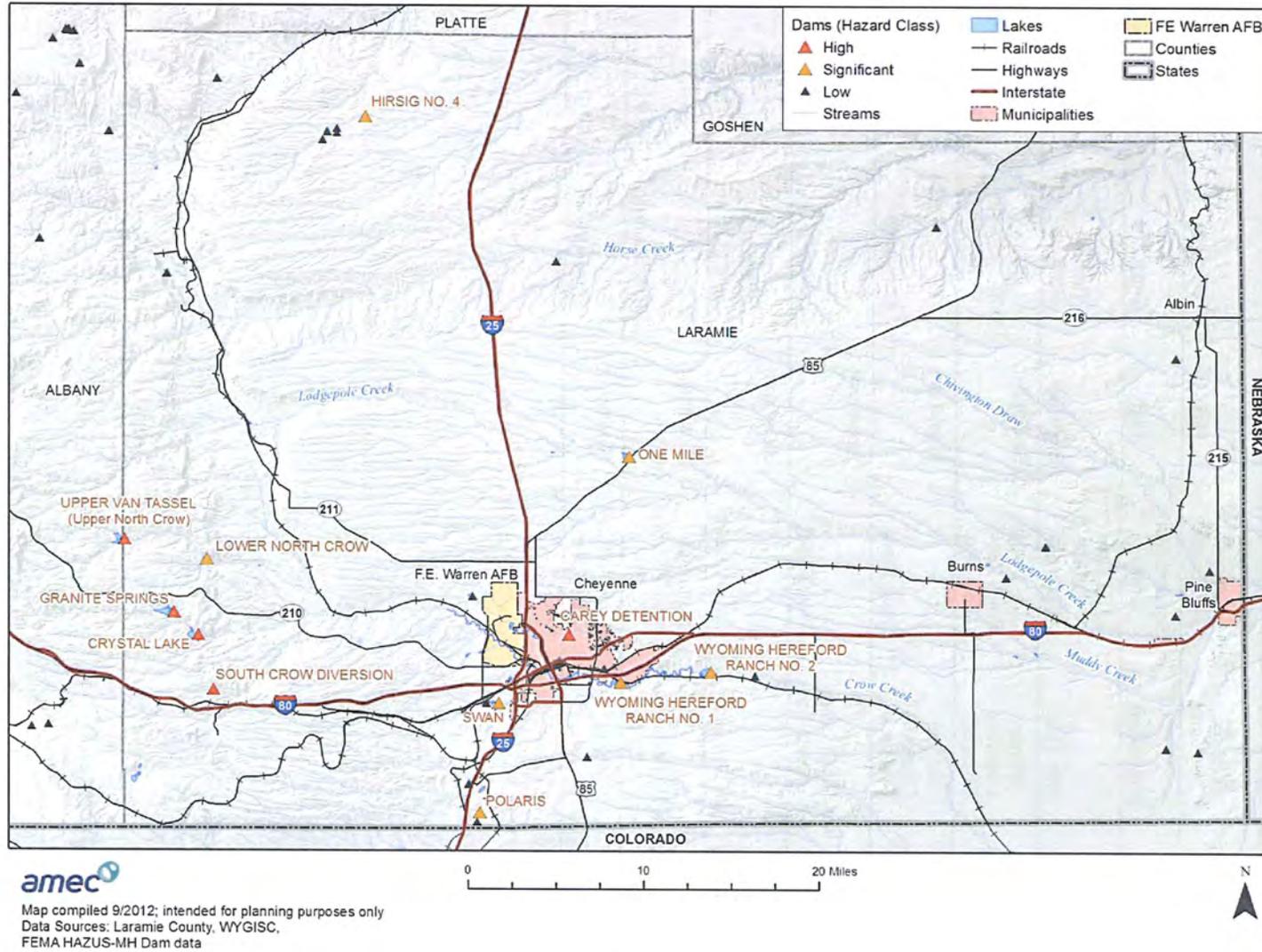
Table 4.4 High and Significant Hazard Dams in Laramie County

Name	Owner	River	Hazard Class	Nearest Downstream City	Distance to Nearest Downstream City (miles)	EAP
Granite Springs	City of Cheyenne	Middle Crow Creek	High	Cheyenne	35	Y
Crystal Lake	City of Cheyenne	Middle Crow Creek	High	Cheyenne	25	Y
Upper Van Tassel (Upper North Crow)	City of Cheyenne	North Crow Creek	High	Cheyenne	46	Y

Name	Owner	River	Hazard Class	Nearest Downstream City	Distance to Nearest Downstream City (miles)	EAP
Carey Detention	City of Cheyenne	Dry Creek tributary of Crow Creek	High	Cheyenne	0	In development
South Crow Diversion	Sutherland	South Crow Creek	High	Cheyenne	20	Y
Polaris	Ron Thiel	Lone Tree Creek Offstream	Significant	Timnath, Colorado	35	N
One Mile	Warren Livestock Company	North Lodge Pole Creek Offstream	Significant	U.S. Highway 85	0	N
Swan	Warren Livestock Company	Clear Creek	Significant	Cheyenne	2	N
Wyoming Hereford Ranch No. 1	J. Sloan Hales and Dean Fog	Crow Creek	Significant	Altvan	2	N
Wyoming Hereford Ranch No. 2	Ed Ferguson	Crow Creek	Significant	Hereford, Colorado	20	N
Hirsig No. 4	True Ranches, Inc.	North Bear Creek TR Bear Creek	Significant	Hawk Springs	0	N
Lower North Crow	City of Cheyenne	North Fork of Crow Creek	Significant	Cheyenne	20	N

Sources: HAZUS 2.1, EAPs

Figure 4.1. Laramie County Dams



Past Occurrences

Dam failure events have occurred in Laramie County. One occurred in August 2008, seven miles southeast of Cheyenne. The Hereford Ranch Reservoir No. 2 dam failed due to structural failure. The event did not result in any property damage, but the cost to repair the dam was estimated at \$100,000. Another dam failure in Laramie County involved Hereford Ranch Reservoir No. 1. On May 19, 2010, this dam failed due to outlet structure and pipe failure. No property damage was recorded for this event. According to the Laramie County Flood Insurance Study (2007) these same dams failed during the 1929 flood. Reservoir No. 1 was subsequently rebuilt and raised during the 1930s.

Laramie County officials were concerned that the North Crow Diversion Dam would fail following heavy rains and melting snow in late April through early May of 1999. Waters from Crow Creek overtopped the dam. On April 30, the waters overtopping the dam were roughly a foot deep. Residents of the Table Mountain development were evacuated on April 30. The residents were allowed to return to their homes late on the night of May 1 after it became clear that the dam was not in danger of failing.

Frequency/Likelihood of Future Occurrences

Laramie County estimates that it is **occasional** that Laramie County will be affected by dam failure in the future. The structural integrity of dams depends on regular inspections and maintenance, which do not always happen. Additionally, a number of the dam failures in Wyoming and other Rocky Mountain states occurred because of snow melt flooding that exceeded the capacity and strength of dams. Wyoming's dams will continue to be tested by snow melt, heavy rains, and other types of floods every year. Thus, dam failures could possibly threaten Wyoming and Laramie County.

Potential Magnitude of Impacts

Four high hazard dams threaten areas of the unincorporated county and the City of Cheyenne. The magnitude of impacts could be similar to that of a flood (see flood hazard profile), but possibly worse if the dam failure occurred from overtopping during a flood event. Dam failures also have higher velocity, debris, and greater depths of flooding, all of which contribute to higher losses. Evacuation and warning is critical to reduce loss of life and injury. Three of the four high hazard dams that threaten the City of Cheyenne are at least 25 miles away. Thus, if the failure was detected there would be adequate warning and lead time. Because of Homeland Security concerns, however, specifics on the areas inundated are not made available for this plan. County EMA has emergency action plans (EAPs) on file for Granite Springs, Crystal Lake, Upper North Crow (aka Upper Van Tassel) and the South Crow Diversion Dam. Inundation maps for the high hazard dams are on file with the HMPC. The HMPC estimates that the potential magnitude of a dam or levee failure would be **critical** due to the risk to Cheyenne.

Vulnerability Assessment

Population

The threat to public safety is the greatest concern during a dam failure event. People living downstream of the dams are obviously at greatest risk. Population vulnerability is greatest in the City of Cheyenne given the number of people living in the city and the geographic location of dams that could affect the planning area. Data on the exact number of people at risk to dam failure is not available at this time.

General Property

Property vulnerabilities to dam failure include structural damage caused by flooding and debris flows. Vehicles may be damaged or rendered at least temporarily un-useable due to the same factors. Contents of homes, storage units, warehouses, and businesses can be damaged by flooding and debris as well. Economic revenue can also be impacted if roads or businesses are closed or destroyed by dam failure. The failure of one of the high hazard dams could result in millions of dollars of damage (see the flood vulnerability assessment) in the Cheyenne area, and potential loss of life, although the probability of such an event is low.

Essential Infrastructure, Facilities, and Other Important Community Assets

The physical structures which comprise essential infrastructure are as vulnerable as those outlined in *General Property*. Flooding and debris flows resulting from dam failure can damage or destroy critical facilities, roads, utility lines, and other important assets. Flooding and debris flows could also prevent first responders and emergency personnel from performing their duties due to impassible transportation routes, damaged critical facilities, or disrupted communications systems.

Natural, Historic, and Cultural Resources

Natural, historic, and cultural resources generally experience the same vulnerabilities outlined in *General Property*. Natural, historic, and cultural resources may be damaged by dam failure if they lie in the path of flooding or debris flows. Endangered flora and fauna can be killed by a dam failure event. Historical or cultural sites can be damaged or destroyed.

Summary

Overall, dam failure is a **medium** significance hazard to Laramie County and the City of Cheyenne. Dam failure is **not applicable** to Albin, Burns, or Pine Bluffs.

PROPERTY AFFECTED: Undisclosed

POPULATION AFFECTED: Undisclosed

PROBABILITY: Occasional

JURISDICTION AFFECTED: County, City of Cheyenne

4.2.3 Drought

Hazard/Problem Description

Drought is described as a protracted period of deficient precipitation resulting in extensive damage to vegetation. Of all the natural weather-related disasters, drought is by far the most costly to our society. It indirectly kills more people and animals than the combined effects of hurricanes, floods, tornadoes, blizzards, and wildfires. And, unlike other disasters that quickly come and go, drought's long-term unrelenting destruction has been responsible in the past for mass migrations and lost civilizations. The 1980 and 1988 droughts in the US resulted in approximately 17,500 heat-related deaths and an economic cost of over \$100 billion. Drought occurs in four stages and is defined as a function of its magnitude (dryness), duration, and regional extent. Severity, the most commonly used term for measuring drought, is a combination of magnitude and duration.

The first stage of drought is known as a meteorological drought. The conditions at this stage include any precipitation shortfall of 75% of normal for three months or longer. The second stage is known as agricultural drought. Soil moisture is deficient to the point where plants are stressed and biomass (yield) is reduced. The third stage is the hydrological drought. Reduced stream flow (inflow) to reservoirs and lakes is the most obvious sign that a serious drought is in progress. The fourth stage is the socioeconomic drought. This final stage refers to the situation that occurs when physical water shortage begins to affect people.

As these stages evolve over time, the impacts to the economy, society, and environment converge into an emergency situation. Without reservoir water to irrigate farms, food supplies are in jeopardy. Without spring rains for the prairie grasslands, open range grazing is compromised. Without groundwater for municipalities, the hardships to communities result in increases in mental and physical stress as well as conflicts over the use of whatever limited water is available. Without water, wetlands disappear. The quality of any remaining water decreases due to its higher salinity concentration. There is also an increased risk of fires, and air quality degrades as a result of increased soil erosion in strong winds (blowing dust).

Geographical Area Affected

The entirety of Laramie County is at risk to drought. The county is located in an arid region that receives only 14.40 inches of precipitation each year. Droughts are often regional events, impacting multiple counties and states simultaneously. Therefore, as the climate of the planning area is fairly contiguous, it is reasonable to assume that a drought will impact the entire planning region. According to the Wyoming State Climate Office, Wyoming is the 5th driest state in the

U.S. Drought can be a normal occurrence in Wyoming due to the State’s natural climate. Based on this information, the geographic extent rating for drought in Laramie County is **extensive**.

Past Occurrences

The planning area has experienced several multi-year droughts over the past several decades. The most recent statewide drought started in 1999, but began in earnest in the spring of 2000 and endured through 2004. According to Figure 4.3, annual precipitation levels increased in 2004, technically signifying the end of the drought period. Dry conditions returned in 2005, improved somewhat in 2006, and then became especially severe in 2007. Drought conditions in the state began to ease in 2008 and continued to improve in the following years. Annual precipitation was actually higher than the long-term annual average in 2010 and 2011. Based on Figure 4.3, this trend appeared to be continuing as of February 2012. The U.S. Drought Monitor for May 2012 indicates that Laramie County, and indeed much of Wyoming, is entering drought conditions. The drought monitor for the week of May 15, 2012 is depicted in Figure 4.4.

Widespread droughts in Wyoming, as determined from stream flow records, were most notable during three periods: 1929-1942, 1948-1962, and 1976-1982. However, the 1999-2004 drought is considered by many to be the most severe in recent history. However, some senior citizens have indicated that they remember streams drying up in the 1930s and 1950s. According to instrument records, since 1895 there have been only seven multi-year (three years or longer) statewide droughts. Based on deficit precipitation totals (negative departures from the long term average), they are ranked statewide. Refer to Table 4.5.

Table 4.5 Significant Multi-Year Wyoming Droughts of the Modern Instrumented Era

Years	Average Annual Precipitation (inches)	Percent of 1985-2006 Average Annual Precipitation (13.04")
1952-1956	10.65	81.69%
1900-1903	10.76	82.52%
1999-2004	11.07	84.89%
1987-1990	11.12	85.28%
1958-1964	11.67	89.49%
1974-1977	11.77	90.26%
1931-1936	11.79	90.41%

Source: 2011 Wyoming Multi-Hazard Mitigation Plan

Laramie County has been included in several regional USDA disaster declarations for droughts. Laramie County was included in disaster declarations for drought in 2006, 2007, and 2008.

As a whole, Wyoming's precipitation record from 1895-2006 reveals that, for the first half of the 20th century (except for the Dust Bowl years of the 1930s), there was generally a surplus of moisture. During the second half of the century there was an increasing trend of increased

periods of drought (Figure 4.2). Figure 4.3 depicts more recent precipitation data for the Laramie County area (Climate Division 8) with precipitation totals through February 2012. According to Figure 4.5, the average annual precipitation total for Climate Division 8 is approximately 14.7 inches. The table beneath the graph in Figure 4.3 shows the annual precipitation totals for 2002 through 2012. From 2002 to 2003, Climate Division 8 did not meet the long-term average precipitation level. 2004 was a wetter year and effectively marked the end of the 1999-2004 drought. 2005, 2008, and 2009 were moderately below long-term average precipitation levels, while precipitation in 2007 was significantly below average. Figure 4.3 indicates that precipitation levels in the Laramie County area have been above the long-term annual average for the past two to three years, indicating that drought conditions improved in the county in 2010. However, the May 2012 U.S. Drought Monitor, shown in Figure 4.4, indicates that the majority of Laramie County is currently in a moderate drought.

Figure 4.2. Wyoming Annual Precipitation: 1895-2006

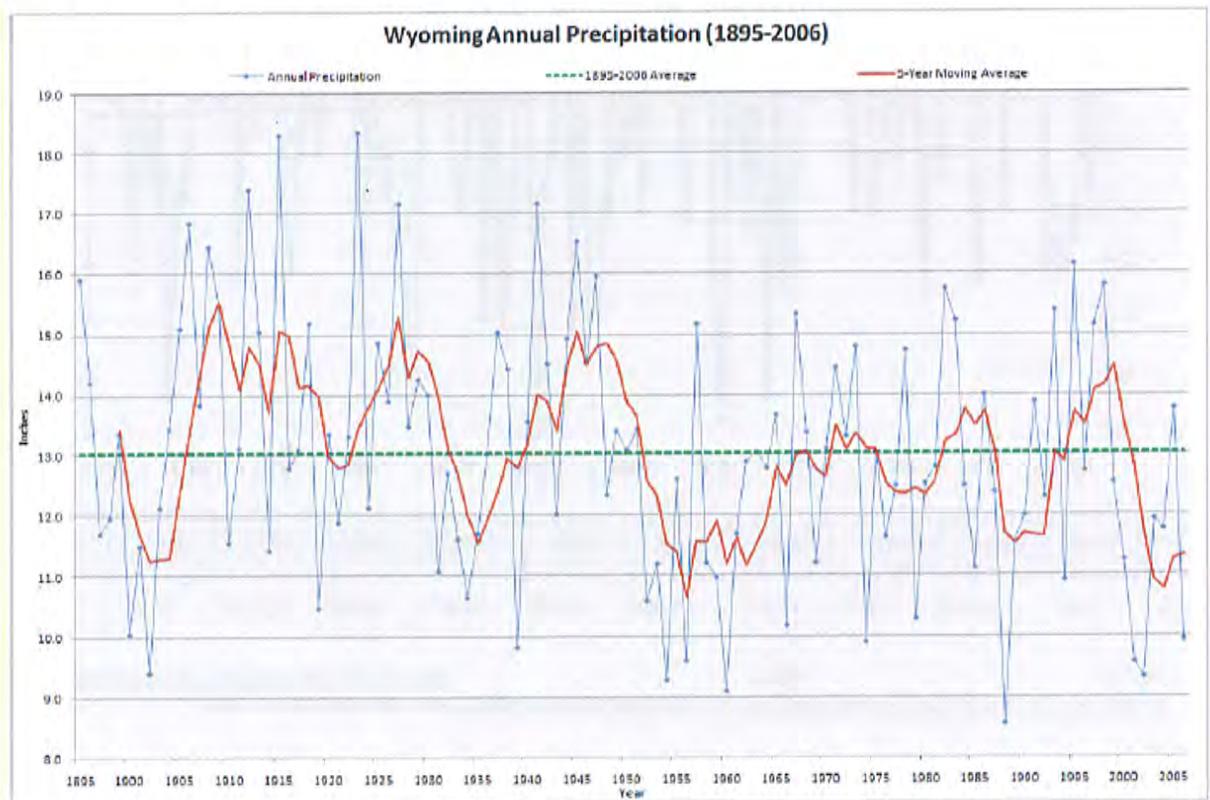
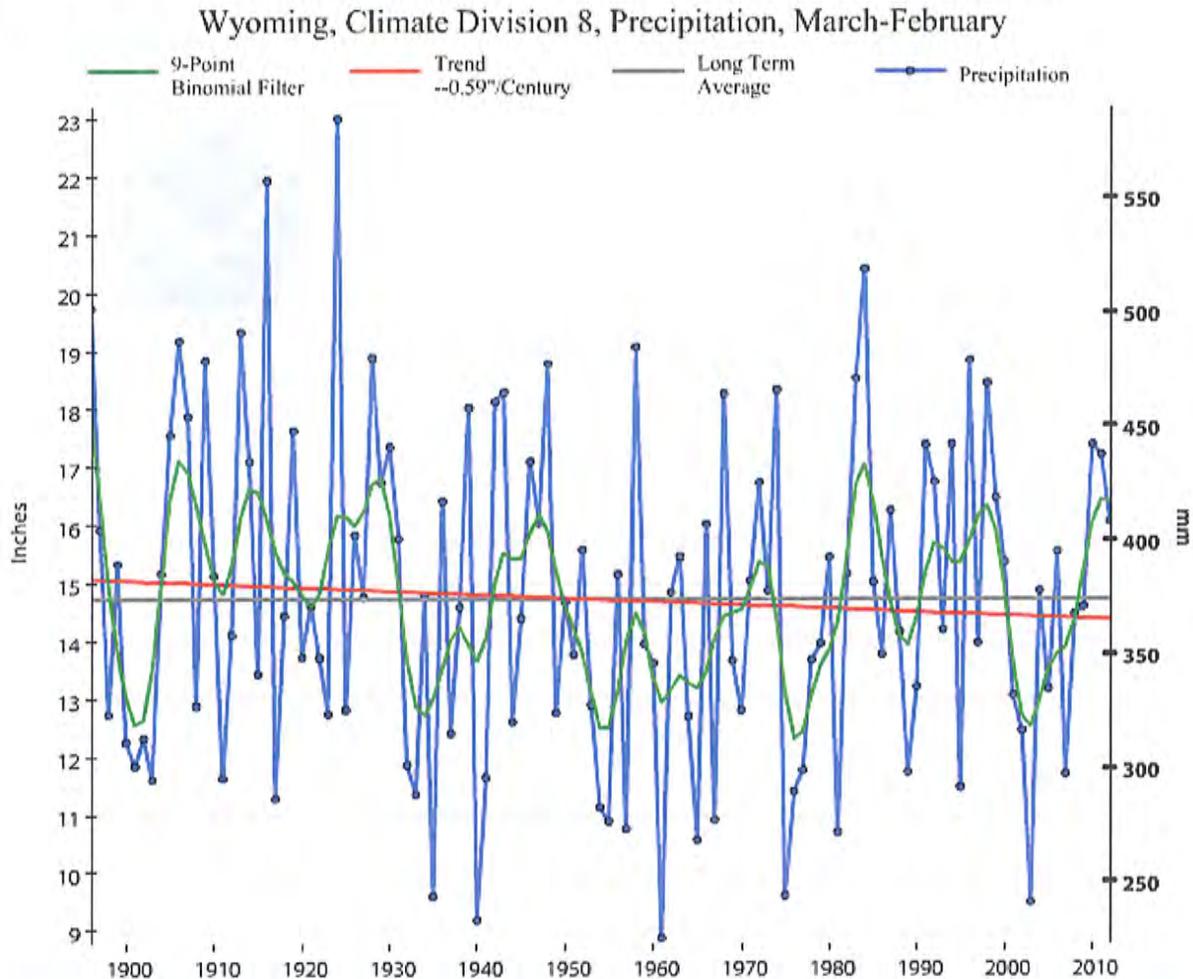


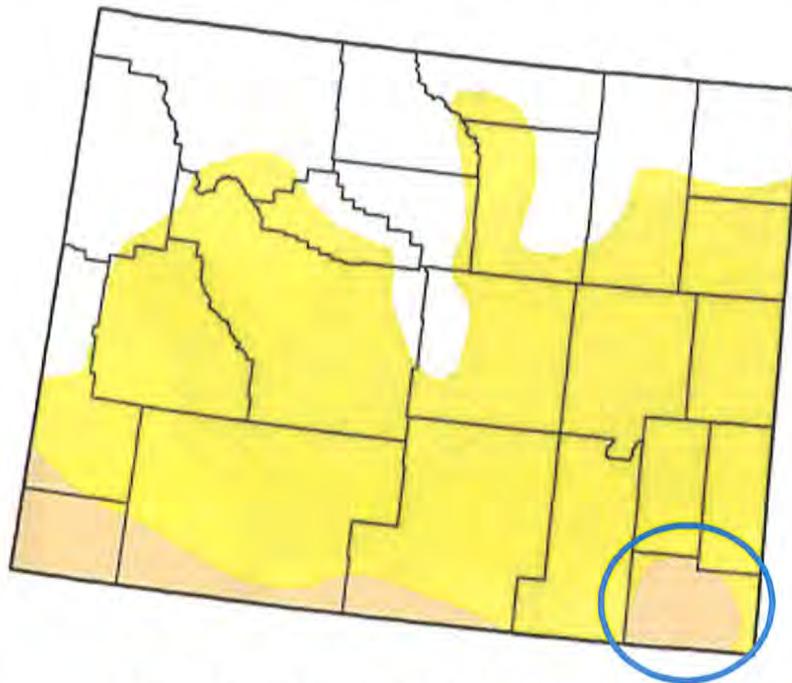
Figure 4.3. Wyoming Precipitation, 12-Month Period Ending in February 2012



1	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
.06"	12.45"	9.49"	14.87"	13.17"	15.55"	11.70"	14.47"	14.60"	17.39"	17.21"	16.07"

Source: NCDC (<http://www.ncdc.noaa.gov/temp-and-precip/time-series/index.php?parameter=pcp&month=2&year=2012&filter=12&state=48&div=8>), accessed April 4, 2012.

Figure 4.4. U.S. Drought Monitor for Wyoming: May 15, 2012 (Laramie County circled in blue)



State Drought Conditions (percent area)

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
05/15/2012	28.62	71.38	7.65	0.08	0.00	0.00

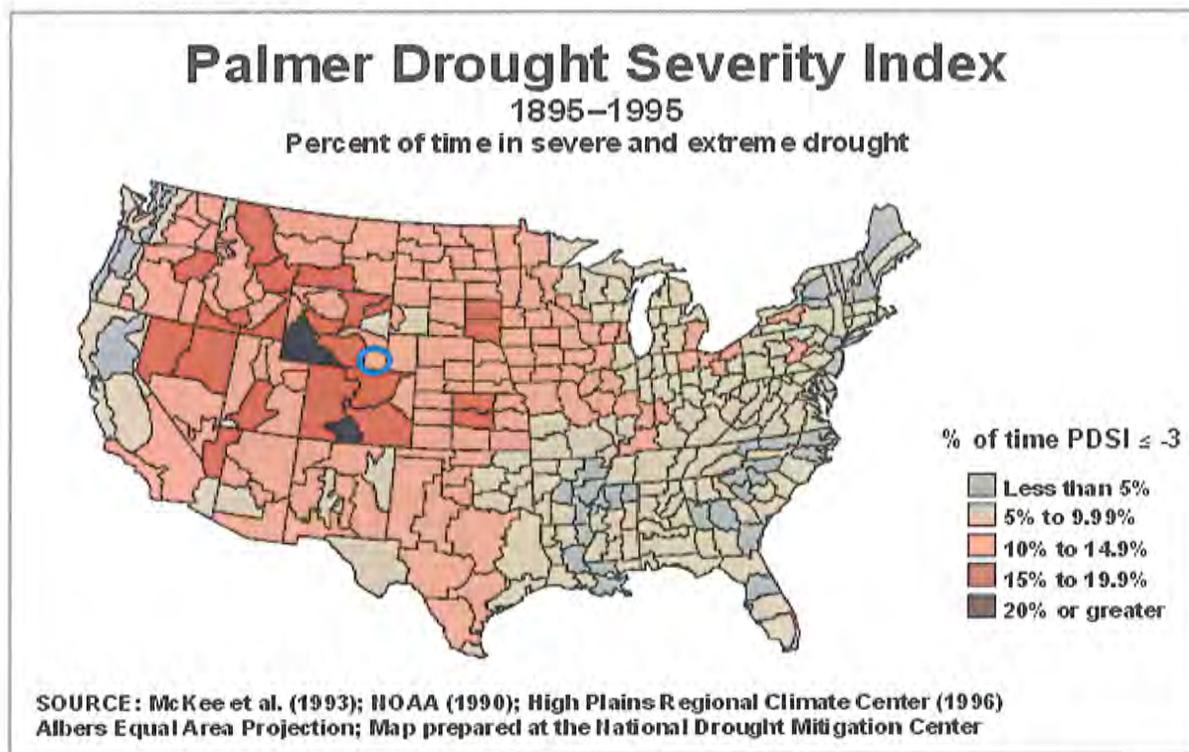
Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Frequency/Likelihood of Future Occurrence

Figure 4.5 indicates that drought occurs approximately every ten years in Laramie County. Figure 4.5 indicates that the planning area spent 10-15% of the 100 year span from 1895 to 1995 in severe or extreme drought. This is consistent with the data in Table 4.5, which suggests that severe multi-year droughts have occurred roughly every ten years since the mid-20th century. An occurrence interval of roughly once every ten years corresponds to a **likely** frequency of occurrence.

Figure 4.5. Palmer Drought Severity Index for the Continental U.S.: 1895-1995 (Laramie County circled in blue)



Potential Magnitude

In order to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area, information from the event of record is used. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of a common occurrence. Based upon Table 4.6 and Table 4.7, the drought of 1999-2004 is as significant, if not more significant than any other droughts in the last 100 years for the entire state. Table 4.5, derived from the Wyoming Climate Atlas, indicates that the most significant droughts in the last century, in terms of precipitation deficit, were in 1952-1956 and 1999-2004. In order to determine which drought period had the most significant impact on Wyoming, crop production and livestock inventory data for the two periods were compared. 1957 and 2005 were wetter years, with annual statewide precipitation totals above the 1895-2006 average. Those two years were used as endpoints for the droughts that started in 1952 and 1999 respectively. In both cases, the years following saw a return to drier conditions. Because of this, the most recent drought impacts were also calculated for 2005 and 2006, and are included in summary tables. Table 4.6 and Table 4.7 show peak decline (%) in production during drought compared to the 5-year pre-drought production average for various commodities.

A comparison of Table 4.6 and Table 4.7 indicate that drought impacts to the Wyoming agricultural community were greater in the 1999-2004 drought than in the 1952-1956 drought. With the exception of dry beans, all commodities in the worst years of the 1999-2004 drought showed a greater percentage decline in production than in the 1952-1956 drought. As a result, the 1999-2004 drought will be used as the drought of historic record to calculate dollar impacts.

Table 4.6 Peak Commodity Production Changes from Pre-Drought (1947-1951) to Drought (1952-1956)

Commodity	5-Year Pre-Drought Production Average (1947-1951)	Units	Lowest Production During Drought (1952-1956)	Year of Lowest Production (1952-1956)	Percent Change
Winter Wheat	5,072	1,000 bu.	2,346	1954	-54%
Spring Wheat	1,579	1,000 bu.	600	1954	-62%
Barley	4,414	1,000 bu.	2,700	1956	-39%
Oats	4,577	1,000 bu.	2,470	1954	-46%
Dry Beans	1,009	1,000 cwt.	589	1955	-42%
Sugarbeets	413	1,000 tons	421	1955	+2%
Corn	227	1,000 bu.	161	1953	-29%
Alfalfa Hay	490	1,000 tons	675	1954	+38%
Other Hay	674	1,000 tons	442	1954	-34%
Cattle/ Calves Inventory	1,050	1,000 head	1,096	1954	+4%

Table 4.7 Peak Commodity Production Changes from Pre-Drought (1994-1998) to Drought (1999-2004)

Commodity	5-Year Pre-Drought Production Average (1994-1998)	Units	Lowest Production During Drought (1999-2006)	Year of Lowest Production (1999-2006)	Percent Change
Winter Wheat	6029	1,000 bu.	2375	2002	-61%
Spring Wheat	648	1,000 bu.	96	2002	-84%
Barley	8383	1,000 bu.	4680	2002	-44%
Oats	1648	1,000 bu.	600	2005	-64%
Dry Beans	691	1,000 cwt.	514	2001	-26%
Sugarbeets	1151	1,000 tons	659	2002	-43%
Corn	6328	1,000 bu.	4165	2002	-34%
Alfalfa Hay	1581	1,000 tons	1150	2002	-27%
Other Hay	817	1,000 tons	450	2002	-45%

Commodity	5-Year Pre-Drought Production Average (1994-1998)	Units	Lowest Production During Drought (1999-2006)	Year of Lowest Production (1999-2006)	Percent Change
Cattle/ Calves Inventory	1536	1,000 head	1300	2004	-16%

Dollar Impacts

Agricultural dollar impacts can also be used to show the effects of drought. In the 2005 Laramie County Hazard Mitigation plan, dollar impacts of drought were derived from “Wyoming Agricultural Statistics 2003” that is compiled by the Wyoming Agricultural Statistics Service of the U.S. Department of Agriculture. Supplemental data through 2003 were provided by the Cheyenne, Wyoming office of the agency. For the 2012 Plan update, post-2003 data was obtained from the Wyoming Field Office of the National Agricultural Statistics Service of the USDA. The dollar impact data in the 2005 Laramie County HMP was statewide. The data in the 2012 Plan update is specific to Laramie County and the commodities are those most relevant to Laramie County, rather than the entire State of Wyoming. As mentioned previously the drought of record began in 1999. Laramie County data for 1999 were not available for this Plan update, so the dollar impact tables begin with the year 2000.

The data below represent changes in production value for crops and changes in inventory value for cattle and calves. As such, the data should be considered impact value versus loss value. For example, with cattle and calves (Table 4.8 through Table 4.15) inventory, the inventory has decreased during the drought. Therefore the value of inventory on hand has decreased. The inventory decreased, however, because of the sale of the cattle and calves. The sales resulted in an increase in cash receipts to the farming and ranching community. The net result, however, is a decrease in inventory value, which is a negative drought impact.

Table 4.8 2000 Production and Inventory Value Impact

Commodity	5-Year Pre-Drought Production Average (1994-1998)	Units	2000 Production	Value (USD)	Production and Inventory Value Impact (USD)
Winter wheat	3168.9	1,000 bu	2120	\$2.7/bu	-\$2,832,030
Dry beans	70.4	1,000 cwt	98.7	\$16.8/cwt	\$475,440
Sugarbeets	27	1,000 tons	49.3	\$32.5/ton	\$724,750
Alfalfa hay	86.5	1,000 tons	74.2	\$85/ton	-\$1,045,500
Other hay	44.6	1,000 tons	23	\$80/ton	-\$1,728,000
Cattle/calves inventory	67	1,000 head	75	\$780/head	\$6,240,000
TOTAL					\$1,834,660

Table 4.9 2001 Production and Inventory Value Impact*

Commodity	5-Year Pre-Drought Production Average (1994-1998)	Units	2001 Production	Value (USD)	Production and Inventory Value Impact (USD)
Winter wheat	3168.9	1,000 bu	1810	\$2.7/bu	-\$3,669,030
Sugarbeets	27	1,000 tons	30.8	\$39.7/ton	\$150,860
Alfalfa hay	86.5	1,000 tons	71.3	\$110/ton	-\$1,672,000
Other hay	44.6	1,000 tons	37	\$105/ton	-\$798,000
Cattle/calves inventory	67	1,000 head	90	\$780/head	\$17,940,000
TOTAL					\$11,951,830

*Laramie County level data for dry beans were not available for 2001

Table 4.10 2002 Production and Inventory Value Impact

Commodity	5-Year Pre-Drought Production Average (1994-1998)	Units	2002 Production	Value (USD)	Production and Inventory Value Impact (USD)
Winter wheat	3168.9	1,000 bu	1443	\$3.7/bu	-\$6,385,830
Dry beans	70.4	1,000 cwt	130.2	\$18.3/cwt	\$1,094,340
Sugarbeets	27	1,000 tons	21.4	\$42.3/ton	-\$236,880
Alfalfa hay	86.5	1,000 tons	68	\$111/ton	-\$2,053,500
Other hay	44.6	1,000 tons	24.5	\$106/ton	-\$2,130,600
Cattle/calves inventory	67	1,000 head	87	\$760/head	\$15,200,000
TOTAL					\$5,487,530

Table 4.11 2003 Production and Inventory Value Impact

Commodity	5-Year Pre-Drought Production Average (1994-1998)	Units	2003 Production	Value (USD)	Production and Inventory Value Impact (USD)
Winter wheat	3168.9	1,000 bu	2314	\$3.4/bu	-\$2,906,660
Dry beans	70.4	1,000 cwt	65	\$17.4/cwt	-\$93,960
Sugarbeets	27	1,000 tons	18.5	\$41.2/ton	-\$350,200
Alfalfa hay	86.5	1,000 tons	86.2	\$80/ton	-\$24,000
Other hay	44.6	1,000 tons	36.5	\$73/ton	-\$591,300

Commodity	5-Year Pre-Drought Production Average (1994-1998)	Units	2003 Production	Value (USD)	Production and Inventory Value Impact (USD)
Cattle/calves inventory	67	1,000 head	64	\$890/head	-\$2,670,000
TOTAL					-\$6,636,120

Table 4.12 2004 Production and Inventory Value Impact

Commodity	5-Year Pre-Drought Production Average (1994-1998)	Units	2004 Production	Value (USD)	Production and Inventory Value Impact (USD)
Winter wheat	3168.9	1,000 bu	2019	\$3.2/bu	-\$3,679,680
Dry beans	70.4	1,000 cwt	65	\$25.9/cwt	-\$139,860
Sugarbeets	27	1,000 tons	22	\$41.7/ton	-\$208,500
Alfalfa hay	86.5	1,000 tons	86.8	\$74.5/ton	\$22,350
Other hay	44.6	1,000 tons	35.9	\$69.5/ton	-\$604,650
Cattle/calves inventory	67	1,000 head	60	\$1,020/head	-\$7,140,000
TOTAL					-\$11,750,340

Table 4.13 2005 Production and Inventory Value Impact

Commodity	5-Year Pre-Drought Production Average (1994-1998)	Units	2005 Production	Value (USD)	Production and Inventory Value Impact (USD)
Winter wheat	3168.9	1,000 bu	2355	\$3.5/bu	-\$2,848,650
Dry beans	70.4	1,000 cwt	104.5	\$18.7/cwt	\$637,670
Sugarbeets	27	1,000 tons	12.3	\$42.8/ton	-\$629,160
Alfalfa hay	86.5	1,000 tons	93.2	\$75/ton	\$502,500
Other hay	44.6	1,000 tons	39.5	\$72/ton	-\$367,200
Cattle/calves inventory	67	1,000 head	60	\$1,140/head	-\$7,980,000
TOTAL					-\$10,684,840

Table 4.14 2006 Production and Inventory Value Impact

Commodity	5-Year Pre-Drought Production Average (1994-1998)	Units	2006 Production	Value (USD)	Production and Inventory Value Impact (USD)
Winter wheat	3168.9	1,000 bu	1914	\$4.58/bu	-\$5,747,442

Dry beans	70.4	1,000 cwt	75.5	\$22/cwt	\$112,200
Sugarbeets	27	1,000 tons	18.6	\$46.8/ton	-\$393,120
Alfalfa hay	86.5	1,000 tons	85.3	\$101/ton	-\$121,200
Other hay	44.6	1,000 tons	32.2	\$103/ton	-\$1,277,200
Cattle/calves inventory	67	1,000 head	71	\$1,010/head	\$4,040,000
TOTAL					-\$3,386,762

Table 4.15 Production and Inventory Value Impact for Worst Year of Drought

Commodity	5-Year Pre-Drought Production Average (1994-1998)	Units	Worst Yearly Production of Drought	Year	Value (USD)	Production and Inventory Value Impact (USD)
Winter Wheat	3168.9	1,000 bu.	1,443	2002	\$3.70/bu	-\$6,385,830
Dry Beans*	70.4	1,000 cwt	65	2004	\$25.9/cwt	-\$139,860
Sugar Beet	27	1,000 tons	12.3	2005	\$42.8/ton	-\$629,160
Alfalfa Hay	86.5	1,000 tons	68	2002	\$111.00/ton	-\$2,053,500
Other Hay	44.6	1,000 tons	24.5	2002	\$106.00/ton	-\$2,130,600
Cattle/Calves Inventory	67	1,000 head	60	2005	\$1,140/head	-\$7,980,000
TOTAL						-\$19,318,950

*Laramie County level data for dry beans were not available for 2001

The data indicates that the 1999-2004 drought can be shown to be the drought of historic record. There have been significant impacts on the agricultural industry from the 1999-2004 drought. The worst-case year for Laramie County was 2004 with a negative dollar impact of \$11,750,340.

Additionally, drought can exacerbate the risk of wildfires; increase the cost of municipal water usage; and deplete water resources used for recreation, affecting the economy. The potential magnitude of drought in Laramie County could be **critical**.

Vulnerability Assessment

Population

Typically, people are not directly vulnerable to drought, though secondary or indirect impacts may increase vulnerability ratings. Drought can adversely affect the incomes of people dependent on water for their livelihoods, such as ranchers, farmers, and outdoor recreation businesses. Water utility companies may be forced to impose water usage restrictions on customers during times of drought. Drought contributes to wildland fire risk, which in turn endangers life safety.

General Property

Like people, structures are typically not directly vulnerable to drought. The structural integrity of residences and businesses is unlikely to be affected, though they may have to deal with water use restrictions imposed by water utility companies. Farms and ranches can be directly impacted by drought conditions. The agricultural sector in Laramie County depends on water for irrigating crops, feeding and watering livestock, and sanitation of animal pens and enclosures. Farmers and ranchers are sometimes forced to reduce their inventory of crops or livestock during droughts. Prolonged droughts could possibly contribute to land degradation in Laramie County. Again, farms and ranches would be the most directly impacted.

Essential Infrastructure, Facilities, and Other Important Community Assets

For Laramie County, the agricultural sector is the most vulnerable to drought and will benefit the most from mitigation efforts. Economic resources tied to agricultural production are potentially vulnerable to drought. Outdoor recreation, which is important to Laramie County's economy, is also vulnerable to drought. The energy and power sector in Wyoming has been impacted by drought in the past. In 2008, the Laramie River Station power plant in Wheatland, WY, faced the risk of running out of cooling water due to drought conditions. The power plant had to draw from the High Plains Aquifer and Wheatland Irrigation District to meet its cooling water demand. Laramie County's growing oil industry depends on large quantities of water as well. Farmers and ranchers in the county have been selling water to the oil industry over the past few years. This frequently provides a more lucrative income than agricultural work. Both the agricultural industry and oil industry will suffer financially from drought.

Natural, Historic, and Cultural Resources

Endangered fauna and flora will be affected by lack of food and water due to drought. Land degradation caused by drought could impact historical resources such as ranches. Drought can have mixed effects on wetlands. In a drier year, it is sometimes easier to manage wetlands through grazing, shredding, or seed germination. However, a prolonged, severe drought can threaten wetlands and the plant and animal species that depend on them for survival.

Summary

Overall, drought is a **high** significance hazard to Laramie County and the Town of Pine Bluffs. It is a **medium** significance hazard in Cheyenne, Albin, and Burns.

PROPERTY AFFECTED: High

POPULATION AFFECTED: High

PROBABILITY: Likely

JURISDICTION AFFECTED: County, City of Cheyenne, Town of Albin, Town of Burns, Town of Pine Bluffs

4.2.4 Earthquake

Hazard/Problem Description

An earthquake is generally defined as a sudden motion or trembling in the Earth caused by the abrupt release of strain accumulated within or along the edge of the earth's tectonic plates. The most common types of earthquakes are caused by movements along faults and by volcanic forces, although they can also result from explosions, cavern collapse, and other minor causes not related to slowly accumulated strains.

The amount of energy released during an earthquake is usually expressed as a Richter magnitude and is measured directly from the earthquake as recorded on seismographs. Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface as felt by humans or resulting damage to structures and defined in the Modified Mercalli scale (see Table 4.16 and Table 4.17). Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

Table 4.16 Modified Mercalli Intensity (MMI) Scale

MMI	Felt Intensity
I	Not felt except by a very few people under special conditions. Detected mostly by instruments.
II	Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.
III	Felt noticeably indoors. Standing automobiles may rock slightly.
IV	Felt by many people indoors, by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle.
V	Felt by nearly everyone. Many people are awakened. Some dishes and windows are broken. Unstable objects are overturned.
VI	Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls.
VII	Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction.
VIII	Damage is slight in specially designed structures, considerable in ordinary buildings, great in poorly built structures. Heavy furniture is overturned.
IX	Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken.
X	Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Considerable landslides occur on steep slopes.
XI	Few, if any, masonry structures remain standing. Rails are bent. Broad fissures appear in the ground.
XII	Virtually total destruction. Waves are seen on the ground surface. Objects are thrown in the air.

Source: USGS. <http://earthquake.usgs.gov/learn/topics/mercalli.php>

Table 4.17 Modified Mercalli Intensity (MMI) Scale and Peak Ground Acceleration

MMI	Acceleration (%g) (PGA)
I	<0.17
II	0.17 – 1.4
III	0.17 – 1.4
IV	1.4 – 3.9
V	3.9 – 9.2
VI	9.2 – 18
VII	18 – 34
VIII	34 – 65
IX	65 – 124
X	>124
XI	>124
XII	>124

Source: Modified Mercalli Intensity and peak ground acceleration (PGA) (Wald, et al 1999).

Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, communication, and transportation lines. Other damaging effects of earthquakes include surface rupture, fissuring, ground settlement, and permanent horizontal and vertical shifting of the ground. Secondary impacts can include landslides, seiches, liquefaction, fires, and dam failure. The combination of widespread primary and secondary effects from large earthquakes make this hazard potentially devastating.

Part of what makes earthquakes so destructive is that they generally occur without warning. The main shock of an earthquake can usually be measured in seconds, and rarely lasts for more than a minute. Aftershocks can occur within the days, weeks, and even months following a major earthquake.

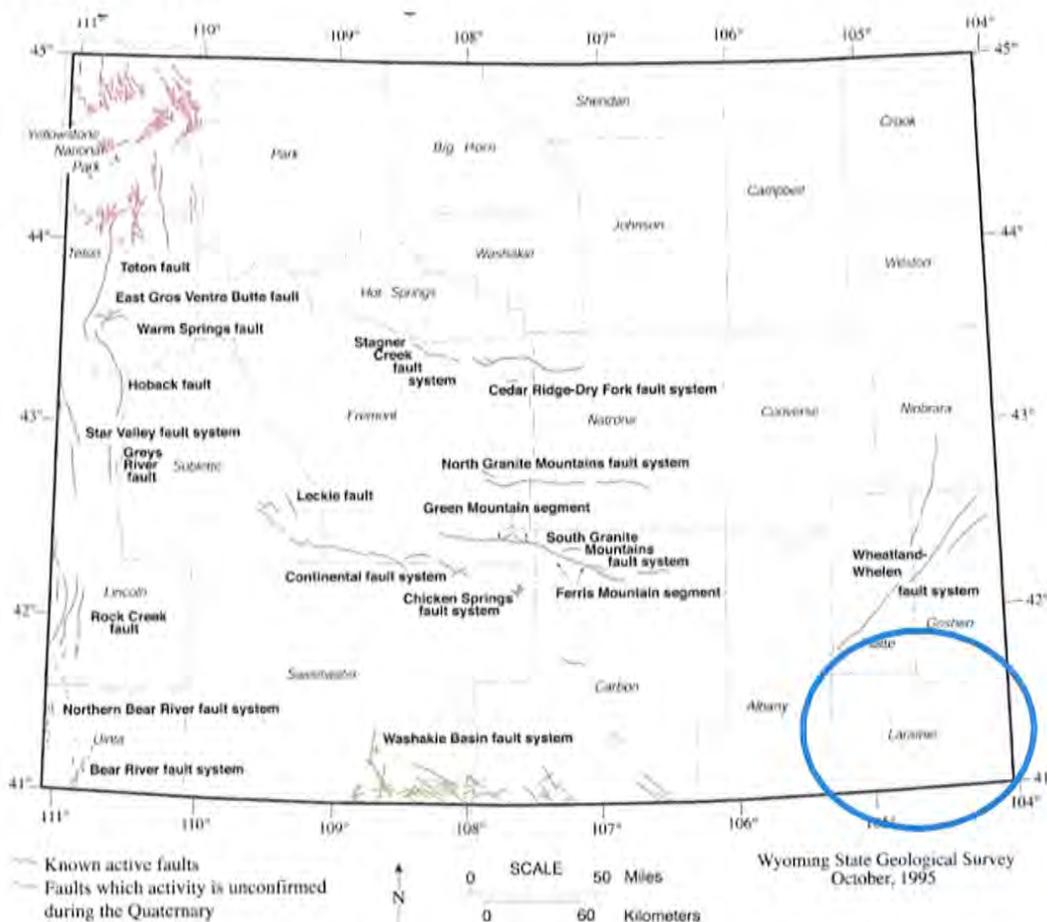
By studying the geologic characteristics of faults, geoscientists can often determine when the fault last moved and estimate the magnitude of the earthquake that produced the last movement. Because the occurrence of earthquakes is relatively infrequent in Laramie County and the historical earthquake record is short, accurate estimations of magnitude, timing, or location of future dangerous earthquakes in the county are difficult to estimate.

Geographical Area Affected

Historically, earthquakes have occurred in every county in Wyoming (see Figure 4.6 and Figure 4.7). The first was reported in Yellowstone National Park in 1871. Yellowstone National Park is one of the more seismically active areas in the United States, but is on the opposite corner of the state from Laramie County. Figure 4.6 shows that no known or suspected active faults have been identified within Laramie County. However, Figure 4.7 indicates that two earthquakes have been recorded in the county. Both earthquakes occurred near the City of Cheyenne.

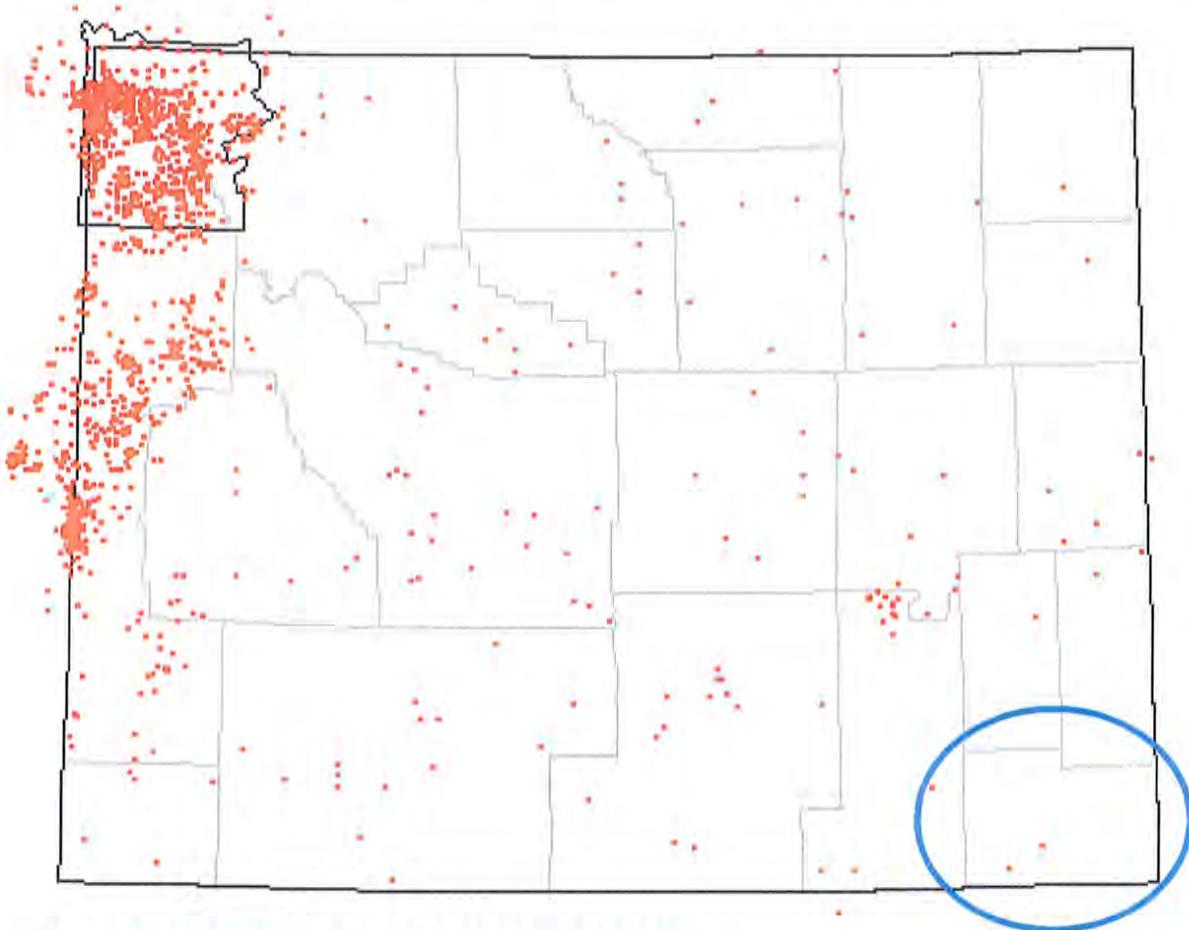
The closest known faults to Laramie County are in the Wheatland-Whelen fault system, which crosses Platte, Goshen, and Niobrara County. The Wheatland-Whelen system is not confirmed to be active. The closest known active fault system in Wyoming is the South Granite Mountains fault system in Carbon County. This fault system was not estimated to cause damage in Laramie County in a Wyoming State Geological Survey statewide earthquake study. In the event of an earthquake, the geographical area affected in Laramie County could be **significant**.

Figure 4.6. Exposed Known or Suspected Active Faults in Wyoming (Laramie County circled in blue)



Source: Wyoming Office of Homeland Security, 2011 Wyoming Multi-Hazard Mitigation Plan, p. 6.2.

Figure 4.7. Wyoming Historic Earthquake Occurrences Statewide from 1871 to 2010 (Laramie County circled in blue)



Source: <http://www.wrds.uwyo.edu/wrds/wsgs/hazards/quakes/quake.html>

Past Occurrences

Three earthquakes have been recorded in Laramie County, one of which was too weak to be given an estimated Intensity rating. The first of these occurred on March 24, 1927. This Intensity III event was centered approximately 5 miles north of Cheyenne. At least five people in Cheyenne felt this Intensity III earthquake, characterized by roughly five seconds of trembling. Two people on the fourth floor of a building also felt the earthquake. No damages were recorded for this event.

The second earthquake in Laramie County was recorded by the U.S. Geological Survey on June 5, 1967, roughly ten miles west-southwest of Cheyenne. This was a very small earthquake that was given no magnitude or Intensity rating. The third earthquake occurred on September 12, 1980, again near the City of Cheyenne (approximately 16 miles west of the city). However, this

particular event was non-tectonic; the magnitude 3.2 earthquake was caused by the explosion of 150 tons of dynamite rather than the Earth's plate tectonics.

Several other earthquakes have occurred near or been felt in Laramie County. The largest earthquake felt in the county occurred on November 7, 1882. The epicenter of this 6.2 magnitude (estimated) earthquake is thought to have been located in northern Colorado near Estes Park. Shaking was felt throughout Colorado and into southern Wyoming and northeastern Utah. The earthquake resulted in some damages in Laramie County, including cracked plaster and broken glass in windows. The event also instilled a sense of apprehension in many people, causing some to run out into the streets.

A second earthquake occurred on November 8, 1992. This earthquake was much smaller than the November 7th earthquake but was still felt in Laramie County. Three Intensity IV earthquakes were felt in Laramie County in 1898, 1931, and 1935. These earthquakes shook beds, rattled dishes and windows, and caused buildings to tremble slightly.

One of the largest earthquakes in eastern Wyoming occurred on October 18, 1984. The epicenter of the event was estimated to be located in northern Albany County, four miles west-northwest of Toltec. This magnitude 5.5, Intensity VI event cracked the wall of a school in Laramie County. Several aftershocks followed the initial earthquake, the largest of which was a magnitude 4.5 event on October 18th. Smaller aftershocks continued to occur as late as December 17, 1984.

Frequency/Likelihood of Future Occurrence

Laramie County Emergency Management estimates that an earthquake has between 1 and 10 percent chance of occurring in the county in the next year, or an **occasional** occurrence rating.

The U.S. Geological Survey (USGS) publishes probabilistic acceleration maps for 500-, 1000-, and 2,500-year time frames. The maps show what accelerations may be met or exceeded in those time frames by expressing the probability that the accelerations will be met or exceeded in a shorter time frame. For example, a 10% probability that acceleration may be met or exceeded in 50 years is roughly equivalent to a 100% probability of exceedance in 500 years.

The USGS has recently generated new probabilistic acceleration maps for Wyoming (Case, 2000). Copies of the 500-year (10% probability of exceedance in 50 years), 1000-year (5% probability of exceedance in 50 years), and 2,500-year (2% probability of exceedance in 50 years) maps are attached. Until recently, the 500-year map was often used for planning purposes for average structures, and was the basis of the most current Uniform Building Code. The new International Building Code, however, uses a 2,500-year map as the basis for building design. The maps reflect current perceptions on seismicity in Wyoming. In many areas of Wyoming, ground accelerations shown on the USGS maps can be increased due to local soil conditions. For example, if fairly soft, saturated sediments are present at the surface, and seismic waves are passed through them, surface ground accelerations will usually be greater than would be

experienced if only bedrock was present. In this case, the ground accelerations shown on the USGS maps would underestimate the local hazard, as they are based upon accelerations that would be expected if firm soil or rock were present at the surface. Intensity values can be found in Table 4.16 and Table 4.17.

Based upon the 500-year map (10% probability of exceedance in 50 years) (Figure 4.8), the estimated peak horizontal acceleration in Laramie County ranges from approximately 2%g in the eastern half of the county to greater than 4%g in the northwestern corner of the county. These accelerations are roughly comparable to Intensity IV earthquakes (1.4%g – 3.9%g) and Intensity V earthquakes (3.9%g and 9.2%g). Intensity IV earthquakes cause little damage. Intensity V earthquakes can result in cracked plaster and broken dishes. Cheyenne would be subjected to an acceleration of approximately 3-4%g or Intensity IV-V.

Based upon the 1,000-year map (5% probability of exceedance in 50 years) (Figure 4.9), the estimated peak horizontal acceleration in Laramie County ranges from 3%g in the southeastern corner of the county to over 7%g in the northwestern corner of the county. These accelerations are roughly comparable to Intensity IV earthquakes (1.4%g – 3.9%g) and Intensity V earthquakes (3.9%g – 9.2%g). Intensity IV earthquakes cause little damage. Intensity V earthquakes can result in cracked plaster and broken dishes. Cheyenne would be subjected to an acceleration of approximately 5%g or Intensity V.

Based upon the 2500-year map (2% probability of exceedance in 50 years) (Figure 4.10), the estimated peak horizontal acceleration in Laramie County ranges from approximately 5%g in the southeastern corner of the county to nearly 15%g in the northwestern corner of the county. These accelerations are roughly comparable to Intensity V earthquakes (3.9%g – 9.2%g), and Intensity VI earthquakes (9.2%g – 18%g). Intensity V earthquakes can result in cracked plaster and broken dishes. Intensity VI earthquakes can result in fallen plaster and damaged chimneys. Cheyenne would be subjected to an acceleration of approximately 9%g or Intensity V-VI.

As the historic record is limited, it is nearly impossible to determine when a 2,500-year event last occurred in the county. Because of the uncertainty involved, and based upon the fact that the new International Building Code utilizes 2,500-year events for building design, it is suggested that the 2,500-year probabilistic maps be used for Laramie County analyses. This conservative approach is in the interest of public safety.

Figure 4.8. 500-year probabilistic acceleration map (10% probability of exceedance in 50 years).

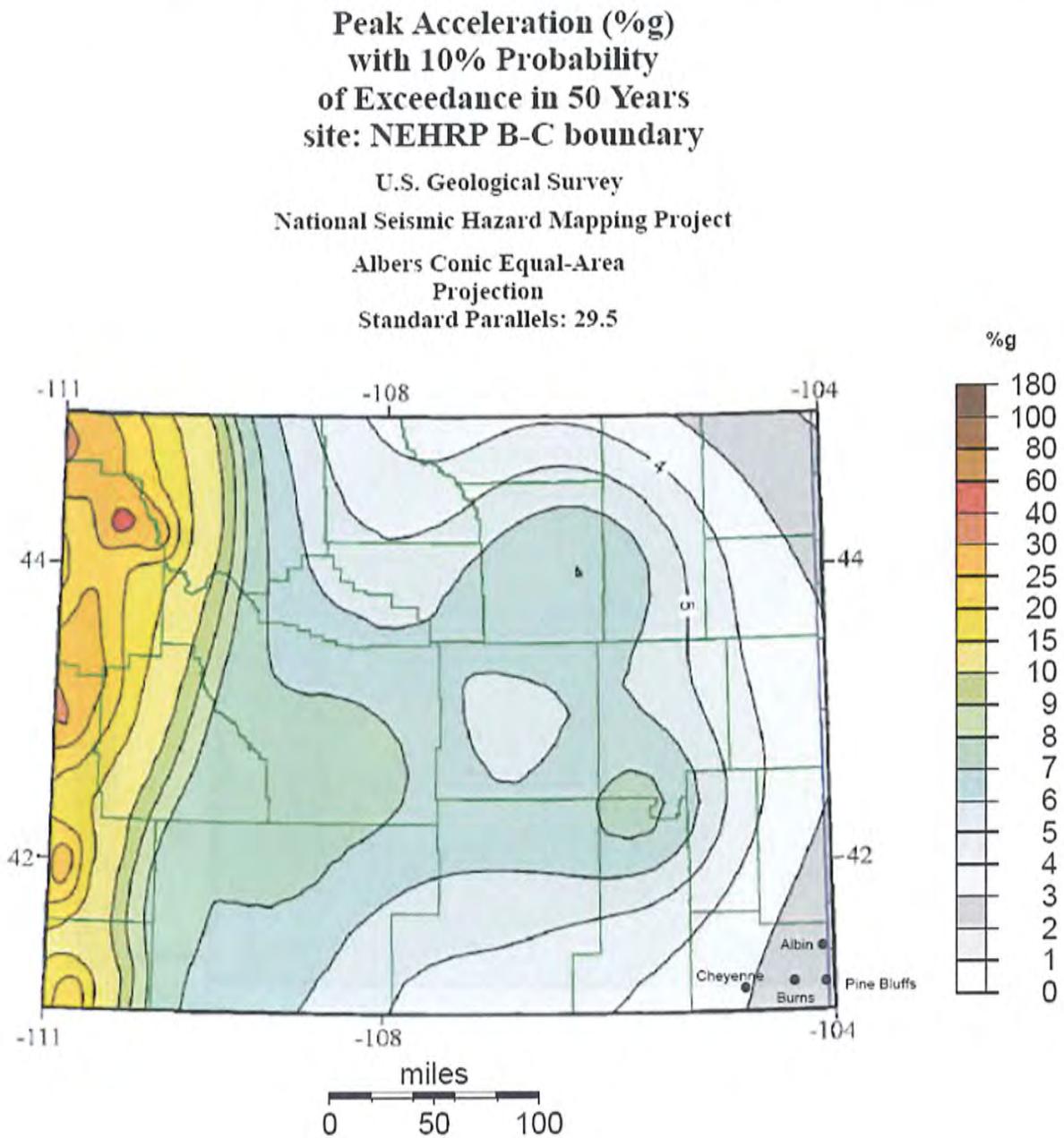


Figure 4.9. 1,000-year probabilistic acceleration map (5% probability of exceedance in 50 years).

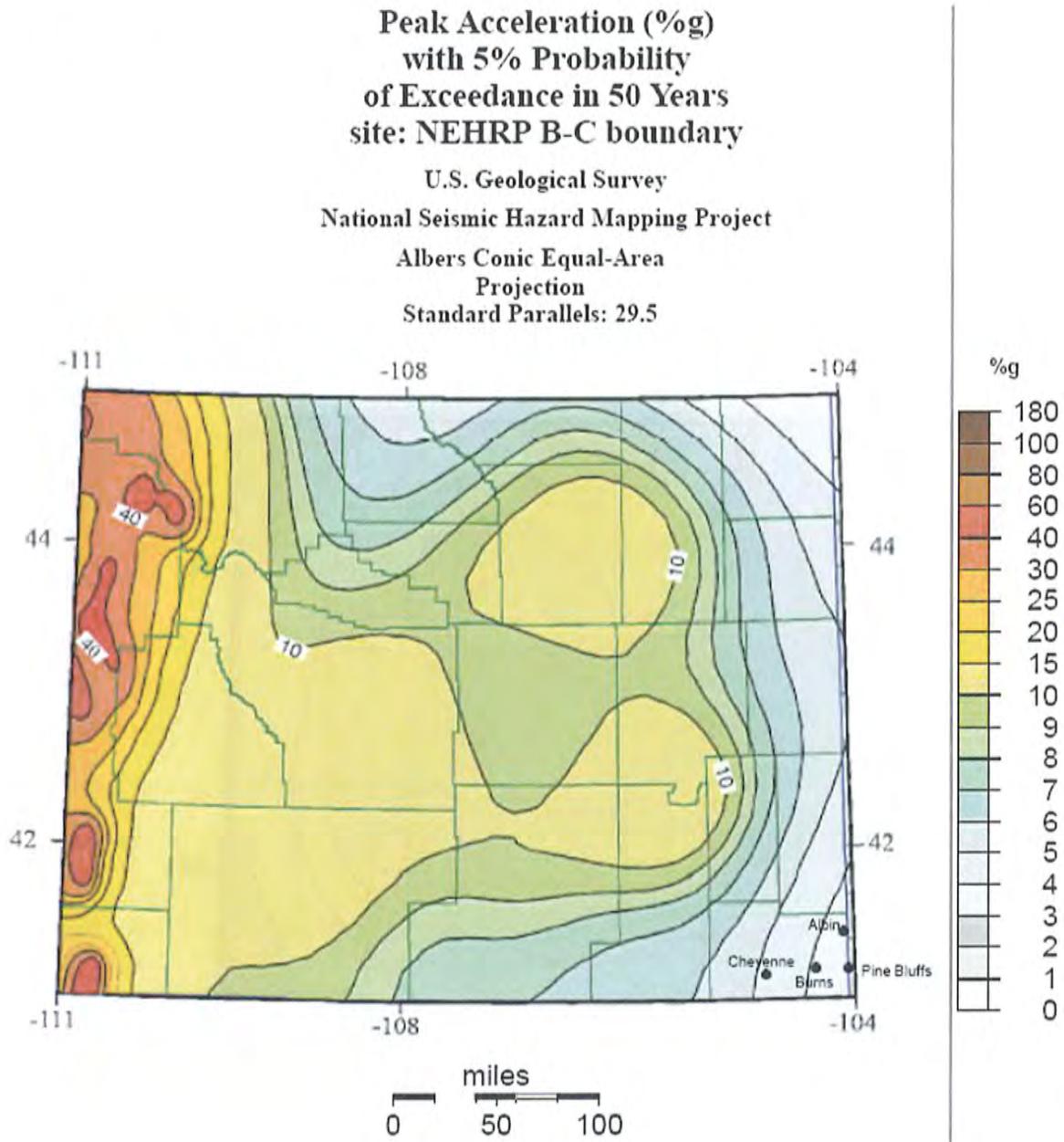
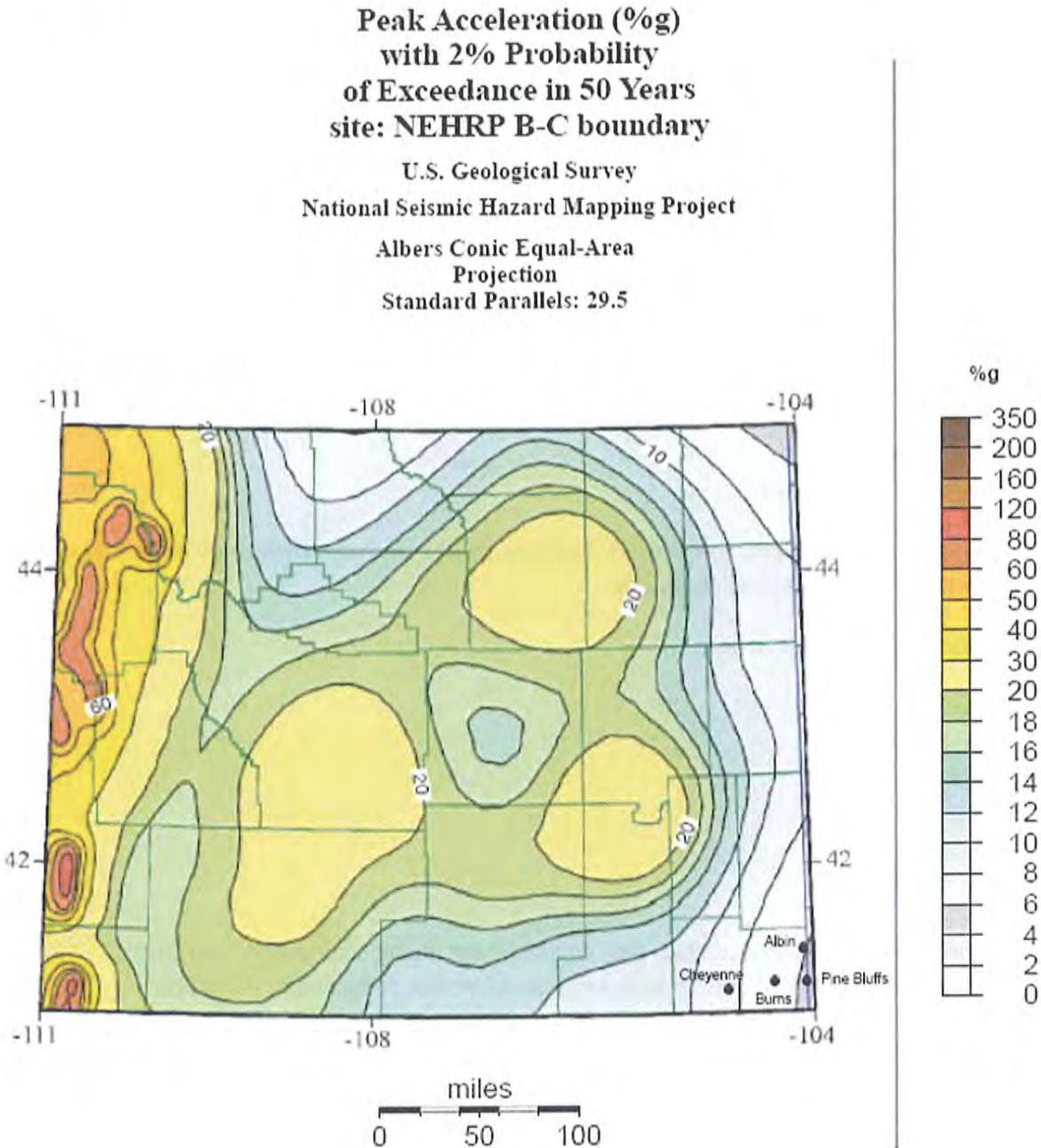


Figure 4.10. 2,500-year probabilistic acceleration map (2% probability of exceedance in 50 years)



Potential Magnitude

The potential magnitude of an earthquake in Laramie County is estimated to be **limited**, resulting in some injuries, complete shutdown of critical facilities for at least 2 weeks, and between 10 and 25 percent of property being severely damaged. There have been two tectonic historic

earthquakes recorded in Laramie County. One of these was estimated at Intensity III, while the other was too small to receive a magnitude or Intensity rating. Larger earthquakes have been felt in Laramie County, but minimal damage was documented during these incidents. Because of the limited historic record, however, it is possible to underestimate the seismic hazard in Laramie County if historic earthquakes are used as the sole basis for analysis. Earthquake and ground motion probability maps give a more reasonable estimate of damage potential in areas without exposed active faults at the surface. Current earthquake probability maps that are used in the newest building codes suggest a scenario that would result in moderate damage to buildings and their contents, with damage increasing from the southeast to the northwest. More specifically, the probability-based worst-case scenario could result in the following damage at points throughout the county:

Intensity VI Earthquake Areas

- Cheyenne
- Federal
- Horse Creek
- Warren Air Force Base

In Intensity VI earthquakes, some heavy furniture can be moved. There may be some instances of fallen plaster and damaged chimneys.

Intensity V Earthquake Areas

- Albin
- Burns
- Carpenter
- Egbert
- Hillsdale
- Pine Bluffs

In Intensity V earthquakes, dishes and windows can break and plaster can crack. Unstable objects may overturn. Tall objects such as trees and power poles can be disturbed.

Vulnerability Assessment

In 2011, the Wyoming State Geological Survey (WSGS) conducted an earthquake study involving 16 scenarios around the State using HAZUS. The 12 HAZUS scenarios were based on fault systems across Wyoming suspected of having potential to produce earthquakes. The remaining four studies were based on historic earthquake events, including the 1882 Estes Park earthquake. The authors of the study point out that the odds of an earthquake occurring in the exact same location are very low. However, areas that have experienced seismicity in the past are identified as a potential source of future earthquakes.

Population

To further analyze the risk and supplement the WSGS study, level 1 HAZUS probabilistic scenarios were conducted as part of the 2012 update. Both an annualized loss and 2,500 year probabilistic scenario was performed as part of the plan update process. Table 4.19 summarizes expected casualties from the HAZUS probabilistic scenario at varying times of the day. Several dozen people could be displaced and require shelter. The HAZUS scenario did not produce any fatalities or life-threatening injuries.

General Property

The Estes Park scenario was run on the basis of historic data, using an estimated magnitude of 6.0. Of the 16 studies, only the Estes Park scenario resulted in damages in Laramie County. Table 4.18 shows Laramie County's estimated number of damaged buildings based on occupancy type. A repeat of the 1882 earthquake would produce minor damage, with only 33 buildings experiencing moderate damage and one with extensive damage.

Table 4.18 Estes Park Scenario: Building Damage by General Occupancy in Laramie County

Occupancy Type	Counts of Buildings					Total
	None	Slight	Moderate	Extensive	Complete	
Agriculture	128	1	0	0	0	129
Commercial	1,865	14	4	0	0	1,884
Education	82	1	0	0	0	83
Government	131	1	0	0	0	132
Industrial	467	4	1	0	0	472
Religion	180	1	0	0	0	181
Other Residential	9,273	88	21	1	0	9,382
Single Family	22,710	42	7	0	0	22,760

Source: WSGS

Impacts to the transportation sector were also minor, including \$2,000 in damages to bus facilities and \$7,000 in damages to airport facilities for a total of \$9,000 in damages to transportation sector. Utility damages would include \$4,000 in damages to water pipelines, \$2,000 in damages to wastewater facilities, \$4,000 to wastewater pipelines, and \$4,000 to natural gas pipelines.

Two criteria were used to rank counties to determine where the impacts of an earthquake would be the greatest. Counties were ranked from highest to lowest according to their estimated loss ratio and estimated total damage in the 2011 Wyoming Multi-Hazard Mitigation Plan (p. 6.24). According to both criteria, Laramie County would be one of the least impacted counties in Wyoming, despite it being the most populated.

To further analyze the risk and supplement the WSGS study, level 1 HAZUS probabilistic scenarios were conducted as part of the 2012 update. Both an annualized loss and 2,500 year probabilistic scenario was performed as part of the plan update process. The 2,500 year scenario takes into account worst case ground shaking from a variety of seismic sources. Results from the loss scenario are shown in Table 4.19. According to this probabilistic scenario there is the potential for roughly 2,436 buildings to experience at least moderate damage and \$105 million in overall economic losses. Casualties would vary based on the timing of the earthquake and be relatively minor based on this analysis.

Table 4.19 HAZUS-MH 2,500 Year Scenario Results for Laramie County

Type of Impact	Impacts to County
Total Buildings Damaged	Slight: 5,181 Moderate: 2,144 Extensive: 278 Complete: 14
Building and Income Related Losses	\$104.62 million 56% of damage related to residential structures 26% of loss due to business interruption
Total Economic Losses (includes building, income and lifeline losses)	\$105.73 million
Casualties (based on 2 a.m. time of occurrence)	Without requiring hospitalization: 23 Requiring hospitalization: 2 Life threatening: 0 Fatalities: 0
Casualties (based on 2 p.m. time of occurrence)	Without requiring hospitalization: 21 Requiring hospitalization: 3 Life threatening: 0 Fatalities: 0
Casualties (based on 5 p.m. time of occurrence)	Without requiring hospitalization: 19 Requiring hospitalization: 2 Life threatening: 0 Fatalities: 0
Damage to Transportation and Utility Systems and Essential Facilities	No expected damage to utility pipeline systems Some damage to transportation systems for highway, bus and airport: Airport: \$0.85 million No expected damage shown to essential facilities, but could have impact on available hospital beds
Displaced Households	49
Shelter Requirements	31

Source: HAZUS-MH 2.1: Earthquake Event Report

The annualized loss scenario represents the estimated long-term average losses the county could endure from earthquakes any given year based on the aggregate of seismic sources in the area. This scenario is recommended in the FEMA How-To Guide 433, "Using HAZUS-MH for Risk Assessment." Based on the HAZUS modeling annualized losses for Laramie County are on the

order of \$1.24 million in total economic losses, with \$0.13 million in building related losses. Transportation inventory damage is estimated at \$1.10 million; Utility lifeline damage is estimated at \$0.0 million.

Essential Infrastructure, Facilities, and Other Important Community Assets

The results of the HAZUS-MH 2,500 year probabilistic scenario indicate that no essential facilities are expected to be damaged.

Natural, Historic, and Cultural Resources

Historic and cultural resources in Laramie County could potentially sustain structural damage in an earthquake.

Summary

Overall, earthquakes are a **medium** significance hazard to Laramie County, Cheyenne, Albin, Burns, and Pine Bluffs.

PROPERTY AFFECTED: Medium

POPULATION AFFECTED: Medium

PROBABILITY: Occasional

JURISDICTION AFFECTED: County, City of Cheyenne, Town of Albin, Town of Burns, Town of Pine Bluffs

4.2.5 Extreme Cold

Hazard/Problem Description

Extreme Cold

Extreme cold often accompanies a winter storm or is left in its wake. It is most likely to occur in the winter months of December, January, and February. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life-threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Extreme cold can disrupt or impair communications facilities. Extreme cold temperatures can destroy crops and cause utility outages, leaving people without water or power until the utility companies are able to restore service.

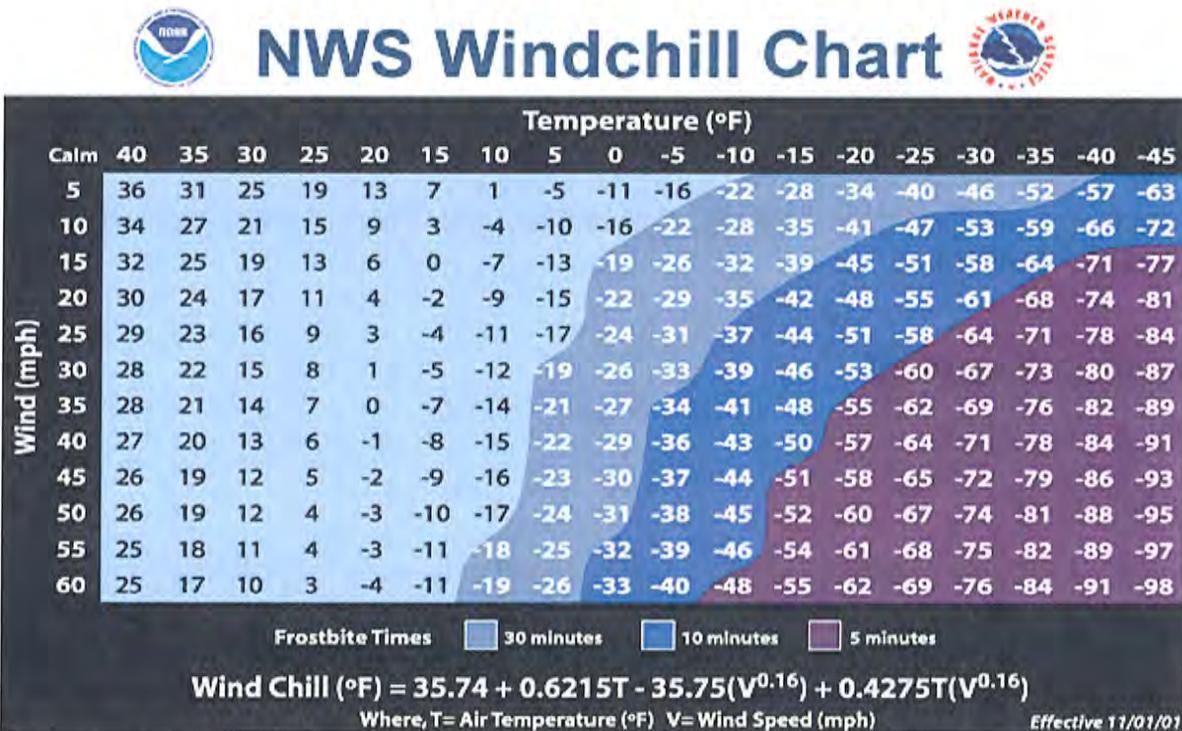
What constitutes extremely cold temperatures varies across different areas of the United States, based on normal climate temperatures for the time of year. In Wyoming, cold temperatures are normal during the winter. When temperatures drop at least 20 degrees below normal winter

lows, the cold is considered extreme and begins to impact the daily operations of the county. Extreme cold/wind chill impacts inanimate objects, plants, animals, and water supplies.

The effects of extremely cold temperatures are amplified by strong to high winds that can accompany winter storms. Wind-chill measures how wind and cold feel on exposed skin and is not a direct measurement of temperature. As wind increases, heat is carried away from the body faster, driving down the body temperature, which in turn causes the constriction of blood vessels, and increases the likelihood of severe injury or death to exposed persons. Animals are also affected by wind-chill however cars, buildings, and other objects are not.

In 2001, the NWS implemented an updated Wind-Chill Temperature index (see Figure 4.11). This index was developed to describe the relative discomfort/danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

Figure 4.11. National Weather Service Wind-Chill Chart



Geographical Area Affected

The inherent nature of extreme cold makes it a regional threat, impacting most or all of the planning area simultaneously as well as extending the effects into the surrounding jurisdictions. Therefore, it is considered to have an **extensive** geographic impact rating. Wind-chill impacts

the county with the same variability expected in high-wind disasters. One part of the county may experience significantly colder wind-chill than another, but the movement of the wind also drives the hazard from one location to another. Theoretically, then, the entire county may be impacted by the same hazard at different times. However, because of the variability of wind, the hazard is classified as having a significant geographic impact rating. When the two ratings for the variables within the hazard profile are combined, the overall geographic extent of the hazard is **extensive**.

Past Occurrences

According to SHELDUS data, three extreme cold events occurred in Laramie County. Although these events took place as a result of winter weather, their primary feature was extreme cold. Therefore, they are profiled in Table 4.20 in this section rather than in Section 4.2.13 Severe Winter Storms and Blizzards. NCDC lists zero extreme temperature events between 1950 and 2010. Table 4.21 and Figure 4.12-Figure 4.14 provide an overview of Laramie County's temperature profile based on data from the Western Regional Climate Center.

Table 4.20 Extreme Cold Events (SHELDUS): 1960-2010

Date	Injuries	Deaths	Property Damages (\$)	Crop Damages (\$)
9/15/1965	0	0	21,739	0
12/25/1983	0	0	21,739	0
2/1/1996	0	0	2,631	0
TOTALS	0	0	46,109	0

Source: SHELDUS

Table 4.21 Laramie County Temperature Summaries

Station	Winter ¹ Average Minimum Temperature	Summer ¹ Average Maximum Temperature	Maximum Temperature	Minimum Temperature	# Days >90°F/ Year	# Days <32°F/ Year
Albin ²	16.8°F	83.3°F	109°F July 10, 1954	-31°F December 22, 1990	24.8	171.1
Cheyenne WSFO AP ³	16.9°F	79.3°F	100°F July 11, 1939 June 23, 1954	-34°F February 8, 1936	9.5	174.1
Pine Bluffs 5W ⁴	13.6°F	83.3°F	103°F July 17, 2006	-37°F December 22, 1989	27.5	191.6

Source: Western Regional Climate Center, www.wrcc.dri.edu/

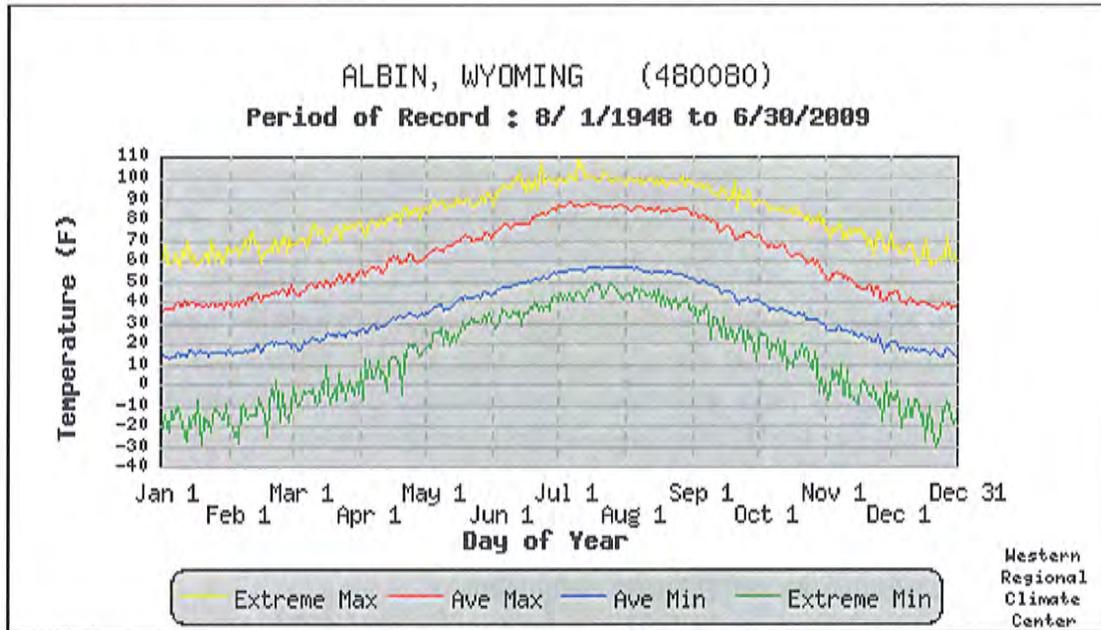
¹Winter: December, January, February; Summer: June, July, August

²Period of record 1948-2009

³Period of record 1915-2012

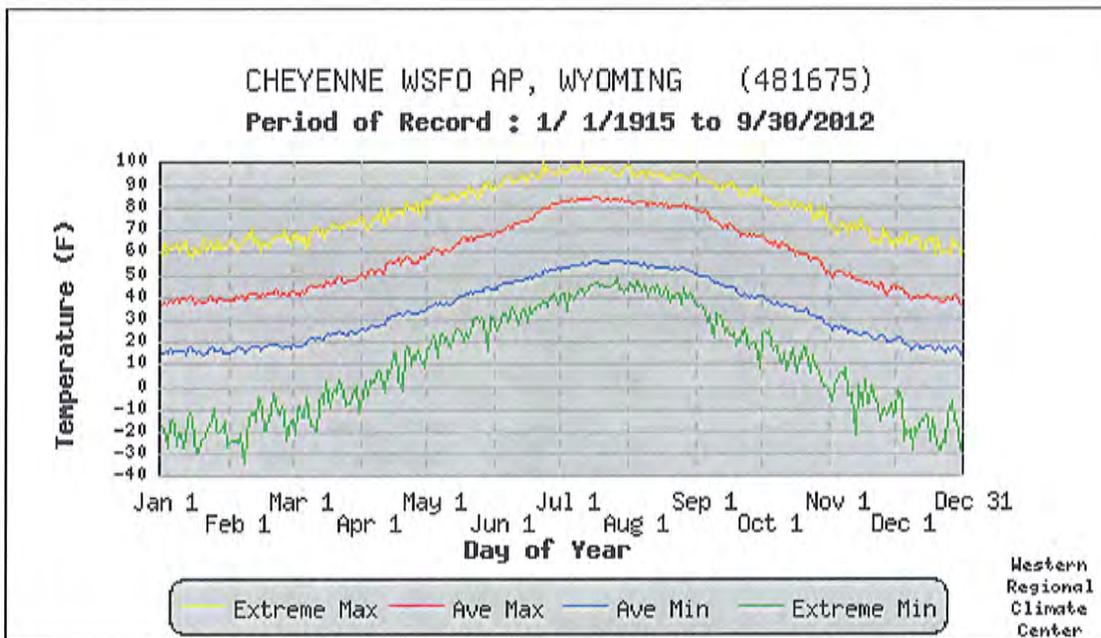
⁴Period of record 1948-2009

Figure 4.12. Albin Station Daily Temperature Averages and Extremes: 1948-2009



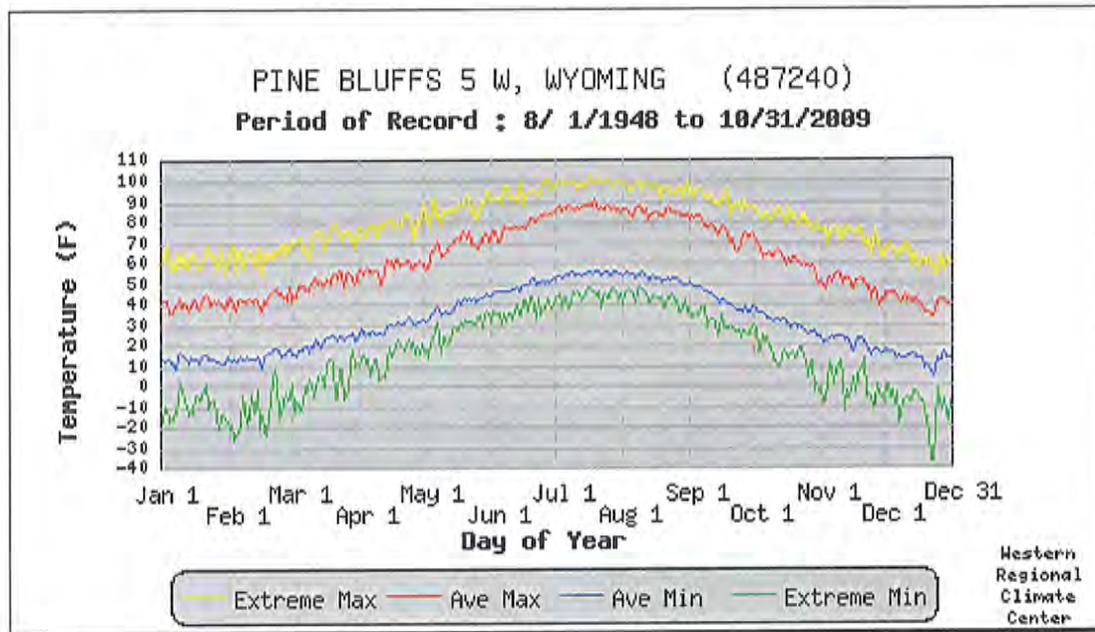
Source: Western Regional Climate Center, www.wrcc.dri.edu/

Figure 4.13. Cheyenne WSFO AP Station Temperature Averages and Extremes: 1915-2012



Source: Western Regional Climate Center, www.wrcc.dri.edu/

Figure 4.14. Pine Bluffs 5W Station Temperature Averages and Extremes: 1948-2009



Source: Western Regional Climate Center, www.wrcc.dri.edu/

Frequency/Likelihood of Occurrence

The National Weather Service and HMPC estimate that extreme cold events are **likely** to occur in any given year. It is important to note that the lack of specific historical accounts on extreme cold temperatures does not necessarily indicate a low frequency of occurrence. Certain hazards occur more frequently in specific areas. Therefore, the residents of these areas are less likely to report events that seem commonplace in the planning area, even though the events may be considered extreme in other locations.

Potential Magnitude of Impacts

In order to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area, information from the event of record is used. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. Based on SHELDUS records, two separate extreme cold events caused the same amount of damage. Without further details, both of these events could serve as the event of record for extreme cold in Laramie County. These events, which occurred on September 15, 1965 and December 25, 1983, resulted in \$21,739 in damages.

Calculating the average annual damage from extreme cold is another method used in assessing potential magnitude. According to SHELDUS, three extreme cold events caused a total of \$46,109 in damages over a 50 year span between 1960 and 2010. This averages out to \$922 in

damages per year. Therefore, Laramie County could expect to sustain roughly \$900 in damages from extreme cold in any given year.

Overall, extreme temperature impacts would likely be **negligible** in Laramie County, with less than 10 percent of the planning area affected. Extreme cold can occasionally cause problems with communications facilities and utility transmission lines. Danger to people is highest when they are unable to heat their homes and when water pipes freeze. Extreme cold can also impact livestock and even crops if the event occurs during certain times of the year.

Vulnerability Assessment

Population

While everyone is vulnerable to extreme cold/wind chill events, some populations are more vulnerable than others. Extreme cold/wind chill pose the greatest danger to outdoor laborers, such as highway crews, police and fire personnel, and construction. The elderly, children, people in poor physical health, and the homeless are also vulnerable to exposure. Overall, the population has a medium exposure to severe cold.

General Property

Extreme cold/wind chill presents a minimal risk to the structures of Laramie County. Property damage occurs occasionally when water pipes freeze and break. Homes without adequate insulation or heating may put owners at a higher risk for damages or cold-related injury. In cases of periods of prolonged cold, water pipes may freeze and burst in poorly insulated or unheated buildings. Vehicles may not start or stall once started due to the cold temperatures and the risks of carbon monoxide poisoning or structure fires increases as individuals attempt to warm cars in garages and use space heaters. Stalled vehicles, or those that fail to start, may result in minor economic loss if individuals are unable to commute between work, school, and home. Driving conditions may deteriorate if extreme cold/wind chill prolongs icy road conditions, which will impact commutes and emergency response times as well. Landscaping and agricultural products may be damaged or destroyed by unseasonable occurrences of extreme cold/wind chill, causing plants to freeze and die. Extreme cold events during calving season can also threaten the agricultural sector. This may increase the indirect vulnerabilities to severe cold by causing greater economic costs and losses for the year. The overall vulnerability of general property is low.

Essential Infrastructure, Facilities, and Other Important Community Assets

Like general property, extreme cold/wind chill events have a limited impact on the physical property of essential infrastructures and facilities. Communications lines such as fiber optic cables can freeze. There may be incidents of delayed emergency response due to stalled vehicles, delays in dispatching due to frozen communications lines, or an increased volume in calls. Hospitals may see an increase in cold-related injuries directly or injuries associated as

secondary effects of the cold (traffic accidents, broken bones, or severe cuts due to slips, etc.) and a prolonged extreme cold/wind chill event may impact hospital personnel capabilities. Personnel working in the cold, such as firefighters, EMTs, police officers and construction workers, have a higher vulnerability due to exposure times, and response capabilities may be hindered. Human services programs that care for at-risk individuals and families may be stressed, but usually can still adequately provide services through the duration of the extreme cold/wind chill event. Unusually high volumes of individuals seeking shelter or food may overwhelm some facilities if the event is prolonged. There may be an increased number of displaced individuals or families due to flooding caused by ruptured pipes, which may strain local aid organizations such as the Red Cross. Older venues or historical properties suffer the same vulnerabilities associated with private and general properties that are older, with the added vulnerability of damaging historic and often irreplaceable property in the process. If the event is extremely extended and impacts multiple other counties and states, which in turn impacts the availability of mutual assistance, the risk factors may increase. The overall vulnerability of essential infrastructure and community assets is medium.

Natural, Historic, and Cultural Resources

Like general property and essential facilities, extreme cold events would likely have a limited impact on the physical property of historic and cultural resources. These structures may experience damage from frozen pipes or utility lines.

Summary

Overall, extreme cold is a **medium** hazard for Laramie County, Cheyenne, Albin, Burns, and Pine Bluffs.

PROPERTY AFFECTED: Medium

POPULATION AFFECTED: Medium

PROBABILITY: Likely

JURISDICTION AFFECTED: County, City of Cheyenne, Town of Albin, Town of Burns, Town of Pine Bluffs

4.2.6 Flood

Hazard/Problem Description

Floods can and have caused devastating damage in Laramie County and are one of the more significant natural hazards in the county. They have caused millions of dollars in damage in just a few hours or days. A flood, as defined by the National Flood Insurance Program (NFIP), is a general and temporary condition of partial or complete inundation of two or more acres of

normally dry land area or of two or more properties from: overflow of waters; unusual and rapid accumulation or runoff of surface waters from any source; or, a mudflow. Floods can be slow or fast rising, but generally develop over a period of many hours or days. Causes of flooding relevant to the county include:

- Rain in a general storm system
- Rain in a localized intense thunderstorm
- Dam failure
- Urban stormwater drainage
- Rain on fire-damaged watersheds

Flash floods and urban small stream floods are the most common types of floods in Laramie County. Unlike areas in the Midwest, seasonal weather patterns usually do not produce spring thaw or moisture patterns that result in large accumulations of moisture/run-off and subsequent prolonged flood stages. Typical weather patterns in the area can produce significant rain and/or snowfall in short time periods that result in local flooding. Laramie County is most prone to significant flood events during the late spring and summer months. These storms typically have a sudden onset, are severe in nature, and move through the area quickly. Such storms may also produce hail, lightning, and tornadoes.

The potential for flooding can change and increase through various land use changes and changes to land surface. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining watersheds or natural drainage channels. These changes are commonly created by human activities. These changes can also be created by other events such as wildfires. Wildfires create hydrophobic soils, a hardening or “glazing” of the earth’s surface that prevents rainfall from being absorbed into the ground, thereby increasing runoff; erosion, and downstream sedimentation of channels.

Flooding in the Cheyenne area in particular has been exacerbated in the past by inadequate drainage, channel system issues, and urbanization. Laramie County and the City of Cheyenne have implemented several drainage projects to mitigate this problem over the years. Drainage improvements are an ongoing effort in the Cheyenne area.

Geographical Area Affected

Figure 4.15 depicts the mapped flood hazard areas in the County. Figure 4.16 shows mapped flood hazard areas in the City of Cheyenne. Flooding poses far less of a threat to Burns and Pine Bluffs, based on FEMA mapping, and Albin has no Special Flood Hazard Area. Therefore, general flood maps are not provided for the three towns in this section. Flood maps for Burns and Pine Bluffs are provided in the property discussion of the *Vulnerability Assessment* subsection. The City of Cheyenne and other urbanized areas are prone to stormwater drainage flooding that may not be represented on FEMA flood maps. The towns also have issues with stormwater drainage that may not be shown on FEMA maps.

Most creeks drain across the county from higher elevations in the west towards the lower elevations in the east. Major creeks include Crow Creek, Dry Creek, and their tributaries. There are several drainage basins in the County, including Crow Creek Basin, Dry Creek Basin, Allison Draw Basin, Holliday Basin, Seventh Avenue Basin, Capitol Basin, Clear Creek Basin, Henderson Basin, and East Lincolnway Basin.

Past flood events in Laramie County indicate that many of the most damaging floods have occurred on Dry Creek and Crow Creek. The 2007 Laramie County Flood Insurance Study examined Clear Creek, Crow Creek, Dry Creek, Western Hills Draw (North Fork Dry Creek), Allison Draw, South Fork Allison Draw, Allison Draw Split Flow Path, and the Wyoming Hereford Ranch Reservoir No. 1 - Emergency Spillway. The City of Cheyenne has suffered the most damage, but major flood events have also struck Albin, Meriden, Pine Bluffs, Carpenter, and unincorporated parts of the county. In Pine Bluffs, the floodplain is located along Lodgepole Creek.

The geographic extent rating for Laramie County is **significant**, meaning that a flood event could impact 10-50% of the planning area. Figure 4.17 depicts flash flood prone areas in Laramie County and the surrounding area based on information provided by the National Weather Service. The flash flood prone areas indicated are Crow Creek (running through Cheyenne) and Lodgepole Creek. The following sections detail the extent and history of flood hazards in the county.

Figure 4.15. Laramie County Flood Hazards

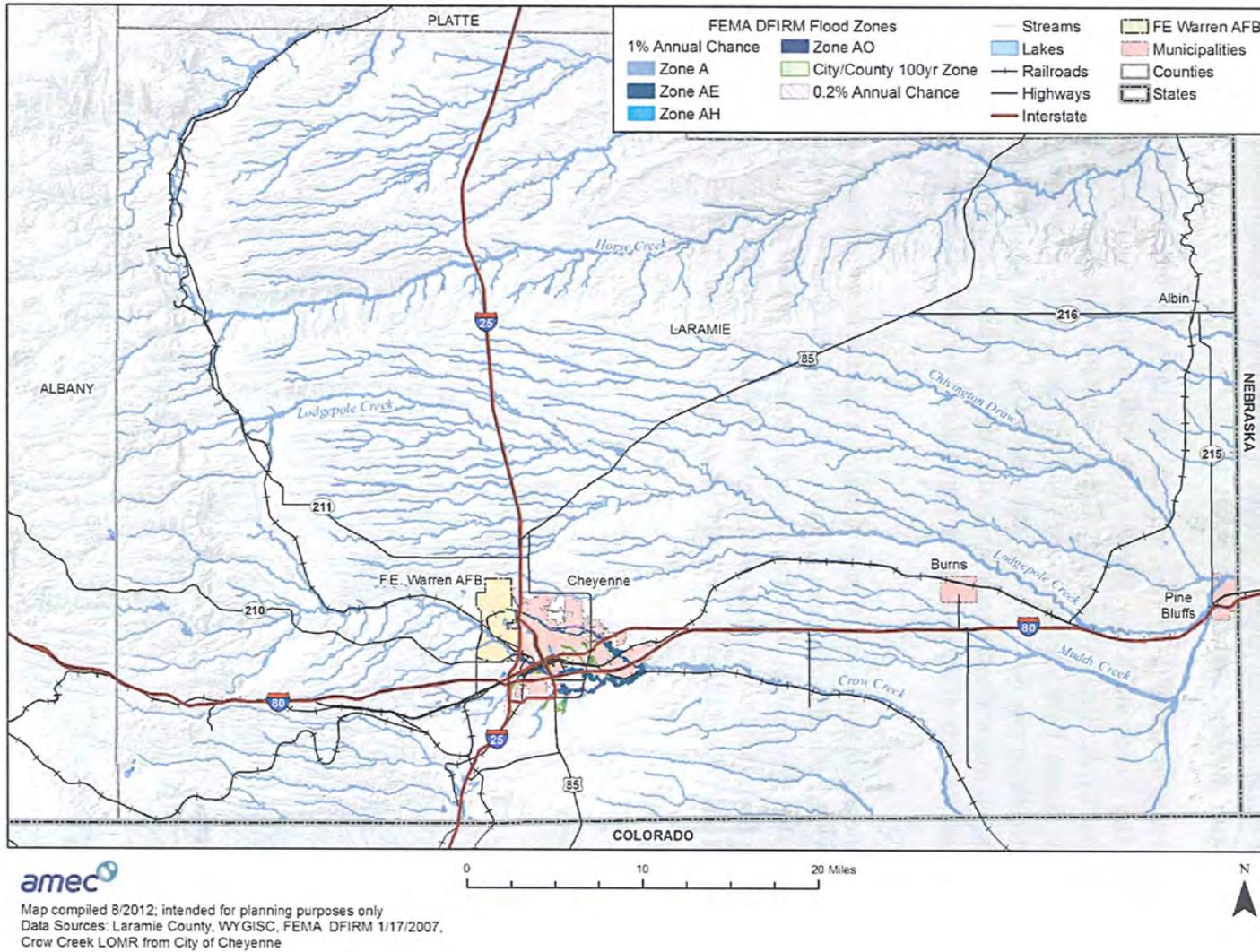


Figure 4.16. City of Cheyenne Flood Hazards

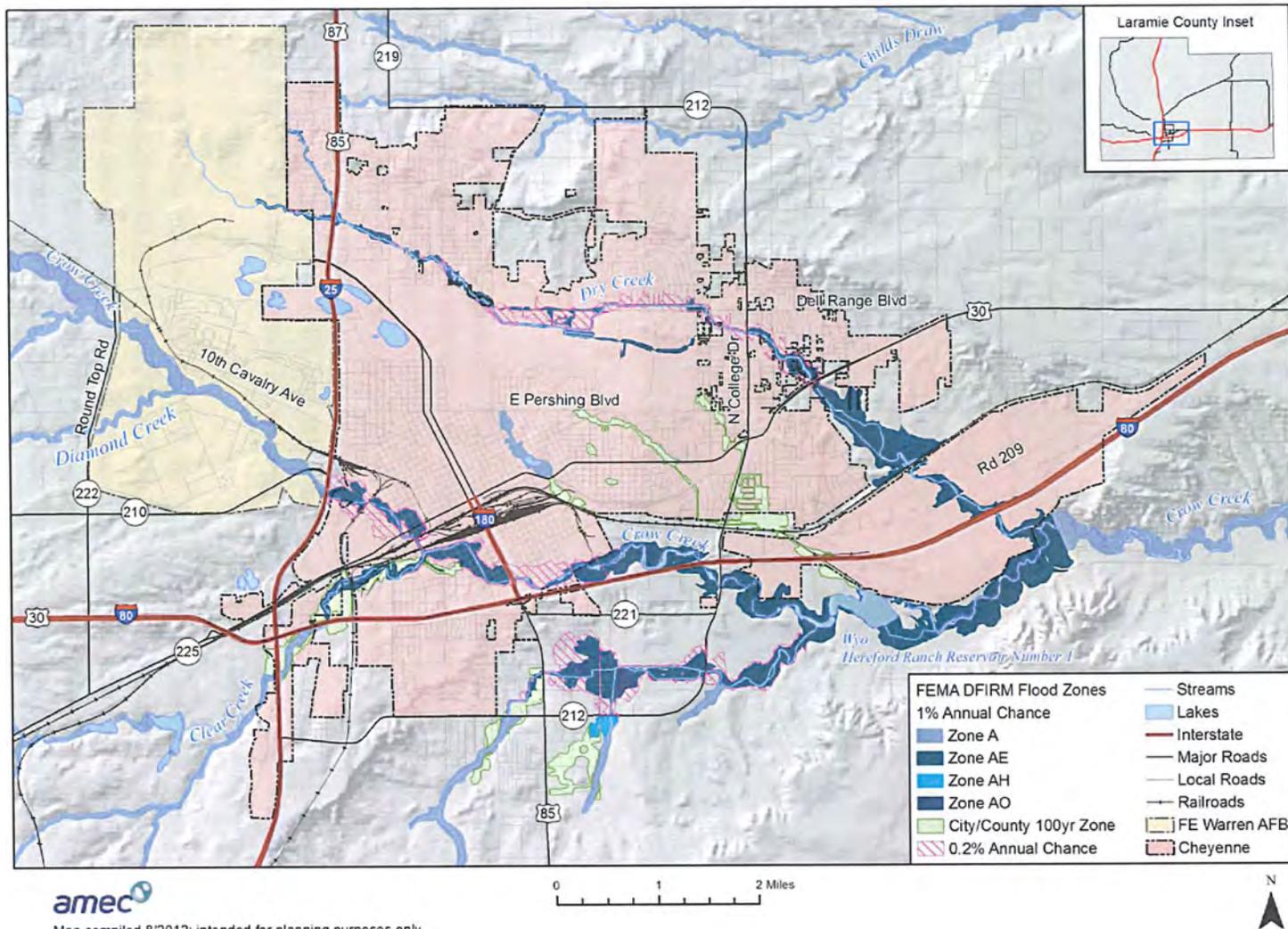
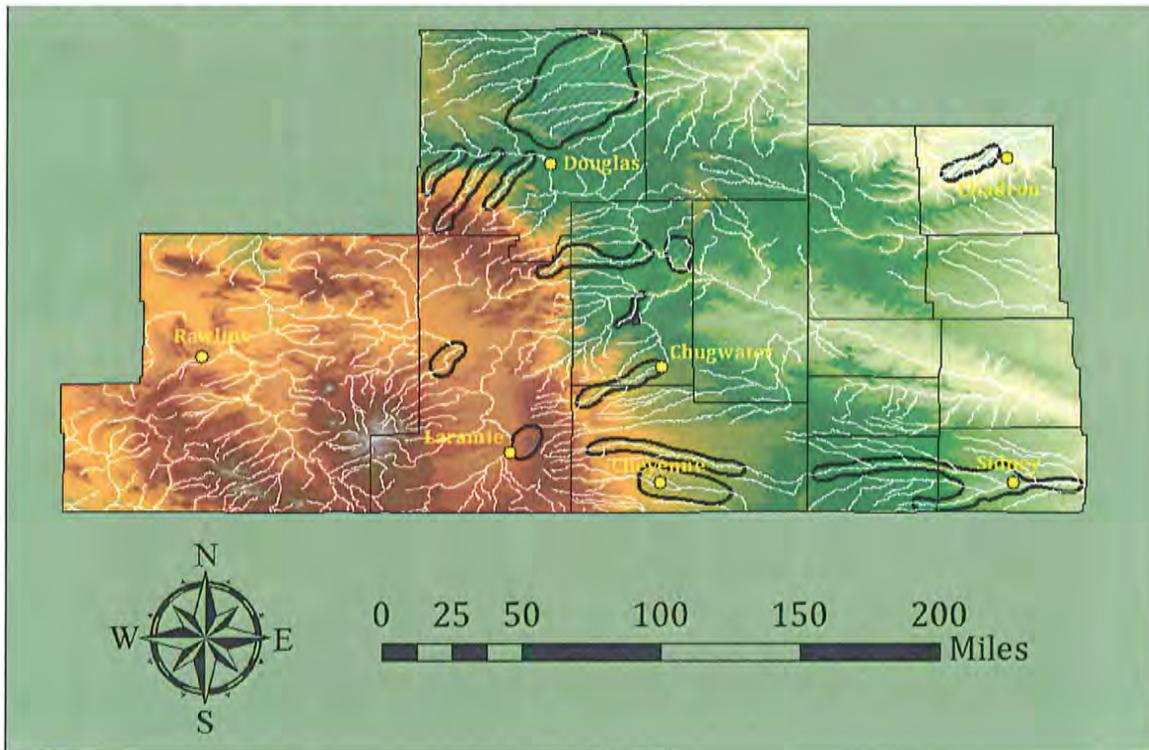


Figure 4.17. Flash Flood Prone Areas in Southeast Wyoming



Source: National Weather Service

Past Occurrences

Laramie County has an extensive flood history with recorded floods dating back to the 1880s. Many of these floods were attributed to severe localized thunderstorms that typically occurred between late spring and the fall. Many of these floods caused extensive damage due to a combination of significant development in the floodplain and poor drainage. Damages were most often related to flooded basements and washed out roads, bridges, or railroads. NCDC lists 35 flood events in Laramie County between 2000 and 2011. All but one of these records is categorized under flash floods. SHLEDUS recorded 22 events between 1960 and 2010, most of which appear to also be flash floods.

The flood history tables below (Table 4.22 and Table 4.23) were derived from NCDC and the SHELUDS database. Other sources include the 2007 FEMA Flood Insurance Study for Laramie County and HMPC accounts. The tables include floods that have caused damage, injuries, or loss of life. The most devastating or damaging floods in Laramie County are discussed in further detail in paragraphs following the tables. Events are organized by year of occurrence. Figure 4.18 through Figure 4.20 depict floods in Cheyenne from 1896, 1985, and 2008.

Table 4.24 summarizes several of the most severe floods in Cheyenne. Three floods are described as being similar in magnitude to the 1985 event, meaning that devastating floods are not atypical in the Cheyenne area. These high magnitude flood events generally occur in the summer months and are caused by intense localized rainstorms. Flash floods and urban small stream floods are the most common types of floods.

The flood data in Table 4.25 was in large part derived from the monthly Storm Data reports generated and released by NCDC. Table 4.25 begins in 1883 and ends in 2000. Table 4.22, which was also derived from NCDC data, summarizes more recent flood events in Laramie County. Other sources are unpublished reports from the Wyoming Office of Homeland Security, newspaper accounts, and periodicals from public libraries. The floods described in Table 4.24 caused damage, injuries, or loss of life in or near Cheyenne.

The emphasis on pre-disaster flood mitigation in Laramie County centers on Crow Creek and its tributaries Dry Creek, Allison Draw, and Clear Creek. The City of Cheyenne is responsible for Crow Creek as it passes through the incorporated boundaries. Cheyenne and Laramie County share Dry Creek with the City being responsible until the channel passes into the incorporated area at the county owned Dry Creek Parkway.

Table 4.22 Historical Flooding Events in Laramie County (NCDC): 2000-2011

Event Type	Location	Start Date	Deaths	Injuries	Property Damage (\$)	Crop Damage (\$)
Flood	West Portion	15-Aug-00	0	0	20,000	0
Flash Flood	Cheyenne	30-Jun-04	0	0	0	0
Flash Flood	Carpenter	03-Jun-05	0	0	0	0
Flash Flood	Cheyenne	01-Jul-06	0	0	20,000	0
Flash Flood	Cheyenne	02-Jul-06	0	0	0	0
Flash Flood	Cheyenne	03-Jul-06	0	0	0	0
Flash Flood	Cheyenne	12-Jul-07	0	0	2,000	0
Flash Flood	Cheyenne	26-Jul-07	0	0	0	0
Flash Flood	Carpenter	27-Jul-07	0	0	0	0
Flash Flood	Pine Bluffs	03-Aug-07	0	0	0	0
Flash Flood	Cheyenne	17-Aug-07	0	0	0	0
Flash Flood	Cheyenne	22-Aug-07	0	0	0	0
Flash Flood	Pine Bluffs	18-May-10	0	0	200	0
Flash Flood	Carpenter	18-May-10	0	0	500	0
Flash Flood	Burns	18-May-10	0	0	2,000	0
Flash Flood	Cheyenne	18-May-10	0	0	1,000	0
Flash Flood	Burns	18-May-10	0	0	1,000	0
Flash Flood	Burns	18-May-10	0	0	1,000	0
Flash Flood	Burns	18-May-10	0	0	1,000	0
Flash Flood	Pine Bluffs	18-May-10	0	0	100	0

Event Type	Location	Start Date	Deaths	Injuries	Property Damage (\$)	Crop Damage (\$)
Flash Flood	Burns	18-May-10	0	0	100	0
Flash Flood	Cheyenne	19-Jun-11	0	0	0	0
Flash Flood	(CYS) Cheyenne Airport	12-Jul-11	0	0	0	0
Flash Flood	Archer	12-Jul-11	0	0	0	0
Flash Flood	Cheyenne	12-Jul-11	0	0	0	0
Flash Flood	Cheyenne	12-Jul-11	0	0	0	0
Flash Flood	Archer	12-Jul-11	0	0	0	0
Flash Flood	(CYS) Cheyenne Airport	12-Jul-11	0	0	0	0
Flash Flood	Hillsdale	12-Jul-11	0	0	0	0
Flash Flood	Carpenter	12-Jul-11	0	0	0	0
Flash Flood	(CYS) Cheyenne Airport	12-Jul-11	0	0	0	0
Flash Flood	Archer	14-Jul-11	0	0	0	0
Flash Flood	Albin	14-Jul-11	0	0	0	0
Flash Flood	Orchard Valley	24-Jul-11	0	0	0	0
Flash Flood	(CYS) Cheyenne Airport	03-Aug-11	0	0	0	0
TOTALS			0	0	48,900	0

Source: NCDC

Table 4.23 Historical Flooding Events in Laramie County (SHELDUS): 1960-2010

Start Date	Injuries	Deaths	Property Damage (\$)	Crop Damage (\$)
2/8/1966	0	0	21,739	0
6/10/1970	0	0	125,000	0
7/22/1983	0	0	16,666	166
7/22/1984	0	0	125	125,000
8/1/1985	70	12	50,000,000	0
7/31/1996	0	0	10,000	0
8/15/1996	0	0	10,000	0
8/29/1996	0	0	30,000	0
8/16/1997	0	0	1,000	0
4/29/1999	0	0	20,000	0
8/15/2000	0	0	20,000	0
7/1/2006	0	0	20,000	0
7/12/2007	0	0	2,000	0
5/18/2010	0	0	2,000	0
5/18/2010	0	0	1,000	0
5/18/2010	0	0	1,000	0

Start Date	Injuries	Deaths	Property Damage (\$)	Crop Damage (\$)
5/18/2010	0	0	1,000	0
5/18/2010	0	0	1,000	0
5/18/2010	0	0	500	0
5/18/2010	0	0	200	0
5/18/2010	0	0	100	0
5/18/2010	0	0	100	0
TOTALS	70	12	50,283,430	125,166

Source: SHELDUS

Table 4.24 City of Cheyenne Flood History

Date	Event Details
1883	Significant flood along Crow Creek.
July 15, 1896	Precipitation of 4.7 inches in 3 hours and 4.86 inches in 24 hours produced significant flood along Crow Creek.
May 20, 1904	Precipitation of 0.63 inches was recorded during the night of May 19 th . During the afternoon of May 20 th , 1.10 inches of rain and hail fell in 1 hour. Precipitation was probably more intense along the upstream reach of Crow Creek. Maximum discharge was estimated to be 8,500 cubic feet per second.
1918	Large flood occurred along downstream reaches of Dry Creek, approximately the same magnitude as the August 1, 1985 flood event.
June 14, 1926	Severe hailstorm lasting from 10:20pm to 11:05pm concentrated in a 1- by 6-mile area and produced 2.51 inches of precipitation.
April 23, 1929	Storm produced 3.20 inches of precipitation in a 24 hour period.
1929	Large flood event along Dry Creek.
June 2, 1929	Flood in Crow Creek was caused by precipitation near the headwaters west of town, where the ground was already saturated and tributaries were full from melting snow. Maximum discharge was estimated to be 8,200 cubic feet per second.
June 1935	Large flood event along downstream reaches of Dry Creek, approximately the same magnitude at the August 1, 1985 event. Precipitation during the storm was greatest in the Roundtop area at the headwaters of Dry Creek. Flooding also occurred along Crow Creek.
August 1946	Severe storm producing 1 inch of precipitation in the 10 minutes caused flooding along Dry Creek.
June 1955	Intense rains occurred in the afternoon of June 14 th and continued into the next day producing 2.68 inches of precipitation. This produced a large flood along the downstream reaches of Dry Creek at approximately the same magnitude as the August 1, 1985 flood.
1972	Flood occurred along the downstream reaches of Dry Creek. Water surface elevations were slightly lower than those for the 1955 flood event.
August 1985	On August 1 st , intense thunderstorm produced 7 inches of precipitation in the downtown area between 6:20pm and 9:45pm. The storm was accompanied by hail, up to 3 feet in areas. A new 24-hour Wyoming rainfall record was set. Flooding occurred along Dry Creek, Crow Creek, and their tributaries in the City of Cheyenne.

Source: 2005 City of Cheyenne Multi-Hazard Mitigation Plan

Table 4.25 Laramie County Flood History

Location	Start Date	Deaths	Injuries	Property Damage (\$)	Crop Damage (\$)	Total Damage (\$)	Information
Cheyenne, Crow Creek, Dry Creek	July 15, 1896	Loss of lives, number unknown	0	0	0	0	Heavy rain (4.78 inches in 3 hours) caused flooding resulting in extensive damage to buildings, transportation facilities, and utilities.
Cheyenne, Crow Creek	May 20, 1904	2	0	0	0	0	A 500-year flood from heavy rain created a 20-25 foot wall of water down Crow Creek. Damage to buildings, transportation facilities, utilities, bridges and houses washed from foundations; large numbers of people caught in houses. There were 1.10 inches of rain in one hour and estimated discharge of 7,000 CFS. Two children killed.
Cheyenne, Crow Creek	April 23, 1929	1	0	0	0	0	A 500-year flood was caused by heavy rain producing 3.20 inches in 24 hours. The flood damaged buildings, transportation facilities, and utilities. The event resulted in one death. Crow Creek had a discharge of 8,000 CFS.
Cheyenne, Crow Creek	June 1, 1929	1	0	500,000	0	500,000	Flooding was produced by showers near headwaters, ground saturation, and tributaries full of melting snow (WEMA Interagency Hazard Mitigation Report). Flooding was also caused by rainfall combined with snowmelt runoff (Wyoming Floods and Droughts, National Weather Summary 1988-89). The flooding led to bridges, dams, highways, crops, and railroads being damaged at a cost of an estimated \$500,000. There was one death because the individual did not hear warnings to evacuate the area. According to FEMA Flood Insurance Study for March 2, 1994 it was a 500-year flood and Crow Creek had a discharge of 8,000 CFS.
Dry Creek Basin	August 26, 1949	0	0	100,000	0	100,000	A severe storm producing 1 inch of rain in 10 minutes led to widespread street and basement flooding at an estimated cost of \$100,000.
Cheyenne, Dry Creek, Crow Creek	June 15, 1955	0	0	105,000	0	105,000	Heavy rain causing flooding washed out railroad tracks, flooded parts of the city, basements, streets crumbled, estimated cost \$105,000 according to WEMA, Laramie

Location	Start Date	Deaths	Injuries	Property Damage (\$)	Crop Damage (\$)	Total Damage (\$)	Information
							Boomerang, and NOAA. Also, according to these agencies 2.4 inches of rain fell during the storm. According to FEMA Flood Insurance Study March 2, 1994 Dry Creek had a discharge of 5,800 CFS.
Cheyenne	July 22, 1966	0	0	22,500	0	22,500	Heavy rains up to 2 inches with hail measuring up to ¾ inch caused flash flooding. Damage mostly in the central and eastern portion of Cheyenne.
Meriden	August 9, 1966	0	0	22,500	0	22,500	Heavy rain with some small hail did damage to drops and caused some flash flooding with small bridges destroyed.
Cheyenne	July 19, 1973	0	0	2,250	0	2,250	On the 19 th , Cheyenne and part of Laramie County received heavy rains which resulted in swollen creeks and flooded basements. For Cheyenne, it was the second greatest 24-hour rainfall on record and totaled 3.42 inches. The rains occurred over much of the state but seemed heaviest over the southeast corner.
Cheyenne	September 8, 1973	0	0	225,000	0	225,000	A nearly 3 inch downpour of rain with small hail caused flash flooding mainly in downtown Cheyenne. Hail caused damage to trees, shrubs, and flowers.
Cheyenne	May 23, 1982	0	0	22,500	0	22,500	Brief heavy rains from 1.43 inches at the weather office to 2.8 inches on the east side of the city combined with soft hail caused local flooding and evacuation of several homes.
Cheyenne, Crow Creek	July 22, 1983	0	0	25,000	0	25,000	Heavy rain amounting to 3 inches caused a flood where a mobile home park was evacuated and ranches, bridges, roads, and an irrigation system had damage. Estimated damage to bridges was \$25,000. The flooding made a new channel and basements flooded.
Albin	July 31, 1985	0	0	225,000	0	225,000	Five inches of rain and marble sized hail fell at Albin. Basements were flooded and there was extensive flooding of low-lying areas.
Cheyenne, Crow Creek, Dry Creek	August 1, 1985	12	70	65,000,000	0	65,000,000	A nearly stationary severe thunderstorm, or storms, produced the most damaging flash flood on record in Cheyenne and the State of Wyoming. 12 people lost their lives, 70 were injured, and damage to homes, cars, and businesses were estimated at \$65 million,

Location	Start Date	Deaths	Injuries	Property Damage (\$)	Crop Damage (\$)	Total Damage (\$)	Information
							\$61.1 million (Wyoming Floods and Droughts, National Weather Summary, 1988-89), and \$40 million (WEMA). At the NWS Forecast Office near the airport, 6.06 inches of rain fell in just over 3 hours. Three and a half inches fell in just one hour, between 1900 and 2000 MST. Elsewhere in and around Cheyenne, rainfall from the storm totaled between 2 and 6 inches. Around 1900 MST cars and trucks were reported floating down Dry Creek in northwest Cheyenne. By 1930 MST, in addition to blinding rain, hail up to 2 inches in diameter and winds up to 70 mph were occurring in the Cheyenne area. Flood waters in the city were at their height from 1900 to 2200 MST. Dry Creek became a raging torrent through north Cheyenne.
25 W Cheyenne	May 17, 1987	0	0	0	0	0	A thunderstorm developed over the west section of Laramie County during the morning of the 17 th of May. This thunderstorm marched through Laramie County with locally heavy rain and hail. Rains of over an inch were reported west and north of Cheyenne with 0.82 inches of rain reported at the Cheyenne airport. Water got as deep as 3 to 4 feet in areas of Cheyenne. This flooded some parked cars and made a few roads temporarily impassible. Numerous reports of 0.25 to 0.75 inch diameter hail were noted around Cheyenne. Drifts of hail 6 to 8 inches deep were observed about 1.5 miles north of the airport.
Pine Bluffs	July 29, 1990	0	0	2,250	0	2,250	A thunderstorm produced 3 to 4 inches of rain in the Pine Bluffs area between 1500 and 1600 MST. Minor flooding of streets occurred in the city, with some basements flooded.
Near Cheyenne	July 12, 1991	0	0	0	0	0	Heavy rains with thunderstorms brought 1.70 inches of rain 4 miles west of Cheyenne and 1.95 inches of rain 3 miles north of the airport. Street and some basement flooding was reported in Cheyenne.
3 W Cheyenne	July 22, 1991	0	0	0	0	0	A thunderstorm brought 0.56 inches of rain in 45 minutes with some street and basement flooding.
Cheyenne Airport	August 13, 1994	0	0	0	20,000	20,000	A thunderstorm moved north out of Colorado into southwest Laramie County. This storm produced flash

Location	Start Date	Deaths	Injuries	Property Damage (\$)	Crop Damage (\$)	Total Damage (\$)	Information
							flooding in a few small streams in extreme southwest Laramie County, washing out a couple of roads. Rainfall totaled 3.26 inches in an hour and 0.65 inches in 10 minutes.
Cheyenne	July 31, 1996	0	0	10,000	0	10,000	Heavy rain caused by thunderstorms caused urban flooding in Cheyenne.
8 NE Cheyenne	August 15, 1996	0	0	10,000	0	10,000	Heavy rainfall from thunderstorms caused some flooding of creeks in the area.
Cheyenne	August 29, 1996	0	0	30,000	0	30,000	Heavy rainfall from thunderstorms caused flooding in and near Cheyenne. Some roads had up to a foot of water on them and some intersections were closed for a time. Some basements in the north part of town became flooded.
Cheyenne	August 16, 1997	0	0	1,000	0	1,000	Two to three feet of water flooded intersections in southern Cheyenne.
9 ESE Cheyenne to 12 SE Cheyenne	July 9, 1998	0	0	0	0	0	A thunderstorm produced rainfall amounts of up to 3.5 inches 9 miles east of Cheyenne. Water was flowing over Campstool Road, which runs along Crow Creek.
West Portion of Laramie County	August 15, 2000	0	0	20,000	0	20,000	Heavy rains fell over parts of western Laramie County west of Cheyenne, with estimates of 4 to 6 inches over an area southwest of Federal. Some flooding was reported on Happy Jack Road, with parts of County Road 109 washed out.

Source: 2005 Laramie County Multi-Hazard Mitigation Plan

Crow Creek flooded on June 1, 1929, causing an estimated \$500,000 in damages and killing one person in Cheyenne. The flooding was caused by a combination of rain showers, ground saturation, and snowmelt runoff. Bridges, roads, dams, crops, and railroads were damaged by floodwaters. The individual who died did not hear evacuation warnings. FEMA estimated that this was a 0.2% annual chance flood, also known as the 500 year event. The 1929 flood is believed to be one of the most significant floods in Laramie County's history next to the 1985 flood.

A severe thunderstorm flooded Cheyenne on August 26, 1946. Damage to basements and low-elevation apartments resulted in an estimated \$100,000 in property damages.

The Dry Creek Basin flooded on August 26, 1949, resulting in an estimated \$100,000 in damages. A severe storm produced one inch of rain in a mere 10 minutes, flooding streets and basements.

A flood on June 26, 1955 caused \$100,000 in crop damage in northern Laramie County, roughly 18 miles south of Chugwater. The flood washed out roads and train tracks and filled basements with water and hail. The National Guard was called in to help direct traffic and maintain security in the area.

Cheyenne suffered roughly \$225,000 in damages from flooding on September 8, 1973. Three inches of rain and hail caused flash flooding, primarily located in the downtown area. The hail damaged trees, shrubs, and flowers in the city.

Albin suffered extensive flood damage on July 31, 1985. An estimated five inches of rain and marble-sized hail fell over the town. Damages were estimated at \$225,000, most attributable to flood damage in basements.

The most damaging flood in Wyoming's history occurred in Laramie County on August 1, 1985. A severe thunderstorm stalled over Cheyenne and dropped six inches of rain over the city in less than four hours. The storm was also notable for lightning strikes that ignited several fires, three tornadoes, and several inches of hail that piled into drifts. The estimated property loss was roughly \$136,167,242 million in 2011 dollars. 70 people were injured in the flood, and 12 others lost their lives. In one instance, an elderly woman took shelter in her basement after hearing the tornado sirens sound off. Flood waters trapped her in the basement where she ultimately drowned. Most of the deaths resulted from people becoming trapped in their cars by rushing flood waters. Emergency communications systems were washed out in the police department and county courthouse, slowing response times. The Cheyenne Memorial Hospital emergency room was flooded, forcing doctors to relocate to the cafeteria to work on patients. Several areas of the city lost power. An outcome of this event is that Laramie County and the City of Cheyenne have implemented several flood control and stormwater drainage projects, including stormwater basins and channels to divert floodwaters away from people and critical facilities in future floods.

Figure 4.18. Cheyenne During a Rain Storm: August 2008



Source: 2011 Wyoming Multi-Hazard Mitigation Plan

Figure 4.19. Flood Waters on Capital Avenue, Cheyenne: July 15, 1896



Source: 2011 Wyoming Multi-Hazard Mitigation Plan

Figure 4.20. August 1, 1985 Flooding in Cheyenne



Source: 2011 Wyoming Multi-Hazard Mitigation Plan

Frequency/Likelihood of Occurrence

NCDC recorded 35 floods over an 11 year time span (2011-2000). However, most of the floods in the NCDC table resulted in little to no damage. This indicates that flooding in general is highly likely to occur in any given year, but significant or damaging floods will occur in Laramie County less frequently. SHELUS data shows that 22 damaging floods occurred over the 50-year time period between 1960 and 2010. The probability equation is expressed as:

$$\frac{22}{50} \times 100 = 44\%$$

Based on this calculation there is a 44% chance that a damaging flood will occur in any given year, which corresponds to a **likely** occurrence rating.

Potential Magnitude

Magnitude and severity can be described or evaluated in terms of a combination of the different levels of impact that a community sustains from a hazard event. Specific examples of negative impacts from flooding on Laramie County span a comprehensive range and are summarized as follows:

- Flood cause damage to private property that often creates financial hardship for individuals and families;
- Flood cause damage to public infrastructure resulting in increased public expenditures and demand for tax dollars;
- Floods cause loss of personal income for agricultural producers that experience flood damages;
- Floods cause loss of income to businesses relying on recreational uses of county waterways;
- Floods cause emotional distress on individuals and families; and
- Floods can cause injury and death.

The magnitude and severity of the flood hazard is usually determined by not only the extent of impact it has on the overall geographic area, but also by identifying the most catastrophic event in the previous flood history. Sometimes it is referred to as the “event of record.” The flood of record is almost always correlated to a peak discharge at a gage, but that event may not necessarily have caused the worst historic flood impact in terms of property damage, loss of life, etc. The August 1, 1985 flood is considered to be the flood of record for Laramie County. This flood, which occurred along Crow Creek, is estimated to have had a peak flow rate of 8,000 cubic feet per second (cfs). The recurrence interval for that magnitude of discharge on Crow Creek is roughly 0.2 percent annual chance; in other words, this was a 500-year flood. The 1985 flood caused widespread damage, dozens of injuries, and several deaths. This was the most costly flood in Laramie County’s history, not only in terms of property damage, but also regarding human life and safety.

The impact of a flood event can vary based on geographic location to waterways, soil content and ground cover, and construction. The extent of the damage of flooding ranges from very narrow to widespread based on the type of flooding and other circumstances such as previous rainfall, rate of precipitation accumulation, and the time of year. Over the past several years, Laramie County has engaged in an ongoing effort to improve stormwater drainage and flood issues. Completed projects include the Sheridan Reach Flood Control Project, the Henderson Basin detention pond with storm sewers, and the Crow Creek Project from Morrie Avenue to 9th Street. The Crow Creek Project included flood walls, channel improvements, and new bridges were built at Morrie and Warren Avenues. The continuation of flood mitigation projects can decrease the potential magnitude of floods in the county. Emergency management protocols, public emergency notification improvements, and development/land use codes will also help mitigate the impacts of floods.

The potential magnitude for a flood event in Laramie County is estimated to be **catastrophic**. An event of limited magnitude could result in multiple severe injuries, multiple deaths, a complete shutdown of critical facilities for 30 days or more, and damages to more than 50% of the planning area. This is consistent with the flood event history in the county.

Vulnerability Assessment

Population

Vulnerable populations in Laramie County include residents living in known flooding areas or near areas vulnerable to flash floods. Special needs populations are particularly vulnerable. This may include the elderly and very young; those living in long-term care facilities; mobile homes; hospitals; low-income housing areas; temporary shelters; people who do not speak English well; tourists and visitors; and those with developmental, physical, or sensory disabilities. These populations may be more vulnerable to flooding due to limitations of movement, fiscal income, challenges in receiving and understanding warnings, or unfamiliarity with surroundings.

Table 4.26 and Table 4.27 summarize an estimate of the number of people living in flood hazard areas in Laramie County. The vulnerable population estimate was derived by multiplying the average household size in Laramie County, which is 2.44, by the number of residential buildings in the floodplain in each jurisdiction. The estimated population estimate was adjusted for vacancy using a 10% vacancy factor.

Table 4.26 Vulnerable Population to 1% Annual Chance Flood by Jurisdiction

Jurisdiction	Residential Building Count	Estimated Residential Population	Vacancy Rate Adjusted Population
City of Cheyenne	363	886	799
Town of Burns	-	-	-
Pine Bluffs	-	-	-
Unincorporated	325	793	715
Total	688	1,679	1,514

Table 4.27 Vulnerable Population to Combined 1% and 0.2% Annual Chance Flood by Jurisdiction

Jurisdiction	Residential Building Count	Estimated Residential Population	Vacancy Rate Adjusted Population
City of Cheyenne	675	1,647	1,486
Town of Burns	-	-	-
Pine Bluffs	-	-	-
Unincorporated	420	1,025	924
Total	1,095	2,672	2,410

Property and Economic Losses

Potential losses to Laramie County from flooding was analyzed by using an existing digital flood insurance rate map (DFIRM) with parcel data and building address point data provided by the Laramie County Assessor's Office. Geographic Information Systems analysis was used to estimate Laramie County's potential property and economic losses. The county's parcel layer and associated assessor's building improvement valuation data, as well as point locations of buildings based on addresses, were provide by the county's Assessor's Office and were used as the basis for the inventory. Laramie County's Digital Flood Insurance Rate Map (DFIRM) was used as the hazard layer. DFIRM is FEMA's flood risk data that depicts the 1% annual chance (100-year) and the 0.2% annual chance (500-year flood events). Flood zones A, AE, AH, and AO are variations of the 1% annual chance event and were combined into a single zone for purposes of this analysis. Laramie County's existing DFIRM, dated January 17, 2007, was determined to be the best available floodplain data. In addition the City of Cheyenne provided a 1% annual chance flood hazard layer to supplement areas not mapped in the DFIRM. The City of Cheyenne provided a GIS shapefile of a FEMA Letter of Map Revision (LOMR) on Crow Creek that reduced a significant area at risk to the 1% annual chance event to a 0.2% zone. This LOMR was also accounted for in the analysis.

The 100-year and 500-year flood zones were overlaid in GIS on the building point data to identify structures that would likely be inundated during a flood event. Additional analysis was done on the parcel layer by converting the parcel polygons into centroids and overlaying the flood zones to extract parcel counts and valuations in the flooded areas. Building improvement values for each point were then extracted from the parcel/assessor's data and summed for the unincorporated county, the City of Cheyenne, the Town of Burns, and the Town of Pine Bluffs. Albin does not have any mapped flood hazard areas and thus was not analyzed. Results for the overlay analysis are shown in Table 4.28 and Table 4.29. The results are sorted by the flood zone, jurisdiction, and the parcel occupancy type. Occupancy type refers to the land use of the parcel and includes residential, commercial, agricultural, industrial, multi-use and exempt. Contents values were estimated for the buildings based on their occupancy type using percent values of the structure with values consistent with HAZUS. All commercial, agricultural, mixed-use, and exempt contents totals were calculated at 100% of improved value. Industrial structure contents were estimated at 150% and residential structure contents were estimated at 50% of improved value. The total value field represents the totals of the improved value and estimated contents value. Building loss is based on the depth of flooding in the structure. The loss estimate field is the calculation of a 20% loss factor applied to the total building and content dollar exposure. The loss factor rate is based on FEMA's depth damage functions and for this planning level analysis assumes a 2 foot deep flood across all flood hazard areas.

There are 1,260 buildings in the 1% annual chance flood zone. The total improved market building value in that flood zone is \$132 million; the sum of building and contents value in that flood zone is estimated to be \$218.7 million. Assuming a 2 foot depth flood, losses could be in the order of \$43.7 million from the 1% annual chance flood event in Laramie County. There are

792 additional buildings within the 0.2% annual chance flood zone. Table 4.29 shows the combined loss estimate from the 1% annual chance and the 0.2% annual chance flood events. The combined total improved building value for these two zones is \$218.6 million. Assuming a 2 foot depth, a 0.2% annual chance flood event could incur an estimated loss of \$74.6 million.

Figure 4.21 through Figure 4.24 show the location of properties lying within the 1% and 0.2% annual chance flood zones in Unincorporated Laramie County, the City of Cheyenne, the Town of Burns, and the Town of Pine Bluffs.

The City of Cheyenne has the most exposure to dollar loss and number of buildings at risk in the event of a 1% and 0.2% annual chance flood. There are 1,100 structures at risk within the city boundaries, representing 54% of the total estimated buildings at risk within Laramie County. Unincorporated Laramie County has a significant floodplain building exposure and associated potential for significant dollar losses. The estimated count of buildings at risk is 949, which represents 46% of the total estimated buildings at risk within the county. The Town of Burns has two commercial structures located within the 1% annual chance floodplain of Child's Draw. The Town of Pine Bluffs has one agricultural structure located within the 1% annual chance floodplain of Muddy Creek.

The City of Cheyenne's total dollar damage estimate for the 1% and 0.2% annual chance of flood is 64% of the total loss estimate for the county. Crow Creek accounts for damage to 441 structures, and 369 structures in Dry Creek, 179 structures in Clear Creek, and 69 structures in Allison Draw. There are 199 structures affected from lake flooding within the City of Cheyenne.

Allison Draw could damage approximately 540 structures within unincorporated Laramie County. The South Fork Allison Draw floodplain contains 246 structures; 202 structures are dispersed among the floodplains of numerous aqueducts, creeks, ditches, draws, tributaries, and lakes within unincorporated Laramie County.

In the City of Cheyenne, 61% of its estimated building damage is to residential structures and 27% is to Commercial structures. The remaining damage in the City of Cheyenne is dispersed among industrial and multi-use properties. Unincorporated Laramie County building damage for residential structures is 44%, and 43% for commercial structures. The remaining damage within Unincorporated Laramie County is dispersed among agricultural, industrial, and multi-use property types.

The loss estimates for this vulnerability assessment are a planning level analysis suitable for flood risk mitigation, emergency preparedness, and response and recovery. The methodology and results should be considered 'reasonable'. Uncertainties are inherent in any loss estimation methodology, and losses will vary depending on the magnitude of the flood event. Other limitations may include incomplete or inaccurate inventories of the built environment. This loss estimation assumes no mitigation and does not account for buildings that may have been elevated above the 1% annual chance event according to local floodplain management regulations. Another limitation to this analysis is that flooding does occur outside of mapped floodplains due

to poor drainage, stormwater overflow, or in the areas adjacent to streams that have not been mapped. The number of flood insurance policies held in areas outside of the A zones is an indication of this. These areas are not included in the analysis, including areas of downtown Cheyenne in the Capitol Basin drainage area. See the discussion on the flood insurance policies later in this section.

Table 4.28 1% Annual Chance Flood Exposure by Jurisdiction

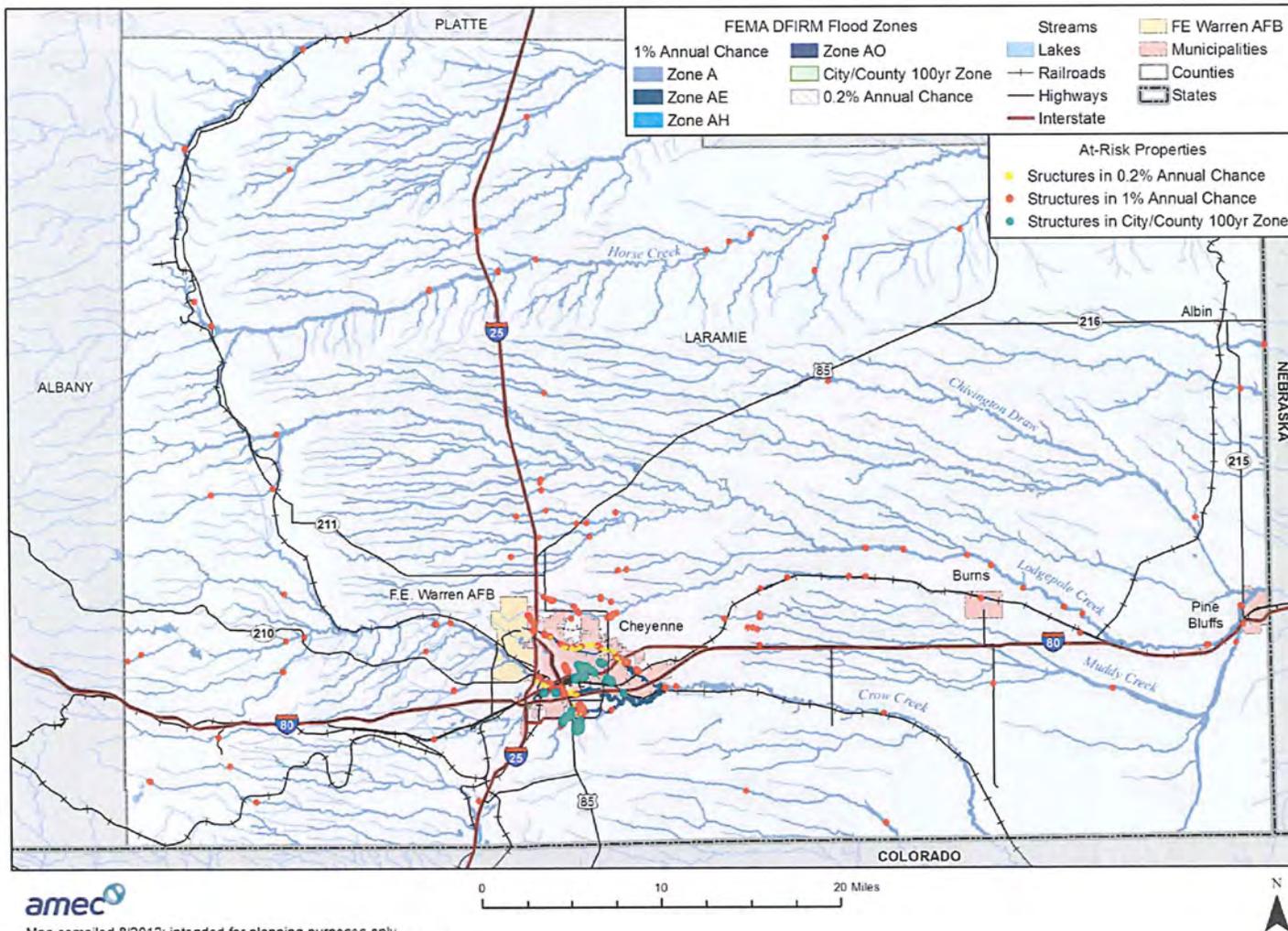
Jurisdiction	Occupancy Type	Building Count	Building Improved Market Value	Contents Value Estimate	Total Value	Loss Estimate
Burns	Commercial	2	\$142,119	\$142,119	\$284,238	\$56,848
	Total	2	\$142,119	\$142,119	\$284,238	\$56,848
Cheyenne	Commercial	126	\$17,477,410	\$17,477,410	\$34,954,820	\$6,990,964
	Industrial	1	\$358,803	\$538,205	\$897,008	\$179,402
	Multi-Use	37	\$3,723,459	\$3,723,459	\$7,446,918	\$1,489,384
	Residential	363	\$36,544,569	\$18,272,285	\$54,816,854	\$10,963,371
	Total	527	\$58,104,241	\$40,011,358	\$98,115,599	\$19,623,120
Pine Bluffs	Agricultural	1	\$535	\$535	\$1,070	\$214
	Total	1	\$535	\$535	\$1,070	\$214
Unincorporated	Agricultural	70	\$7,238,878	\$7,238,878	\$14,477,756	\$2,895,551
	Commercial	293	\$8,528,467	\$8,528,467	\$17,056,934	\$3,411,387
	Industrial	33	\$1,144,073	\$1,716,110	\$2,860,183	\$572,037
	Multi-Use	9	\$587,270	\$587,270	\$1,174,540	\$234,908
	Residential	325	\$56,490,765	\$28,245,383	\$84,736,148	\$16,947,230
	Total	730	\$73,989,453	\$46,316,107	\$120,305,560	\$24,061,112
Total County		1,260	\$132,236,348	\$86,470,119	\$218,706,467	\$43,741,293

Table 4.29 Combined 1% and 0.2% Annual Chance Flood Exposure by Jurisdiction

Jurisdiction	Occupancy Type	Building Count	Building Improved Market Value	Contents Value Estimate	Total Value	Loss Estimate
Burns	Commercial	2	\$142,119	\$142,119	\$284,238	\$56,848
	Total	2	\$142,119	\$142,119	\$284,238	\$56,848
Cheyenne	Commercial	293	\$56,798,498	\$56,798,498	\$113,596,996	\$22,719,399
	Industrial	2	\$384,619	\$576,929	\$961,548	\$192,310
	Multi-Use	130	\$13,175,752	\$13,175,752	\$26,351,504	\$5,270,301
	Residential	675	\$65,129,704	\$32,564,852	\$97,694,556	\$19,538,911
	Total	1,100	\$135,488,573	\$103,116,031	\$238,604,604	\$47,720,921

Jurisdiction	Occupancy Type	Building Count	Building Improved Market Value	Contents Value Estimate	Total Value	Loss Estimate
Pine Bluffs	Agricultural	1	\$535	\$535	\$1,070	\$214
	Total	1	\$535	\$535	\$1,070	\$214
Unincorporated	Agricultural	70	\$7,238,878	\$7,238,878	\$14,477,756	\$2,895,551
	Commercial	410	\$8,834,105	\$8,834,105	\$17,668,210	\$3,533,642
	Industrial	33	\$1,144,073	\$1,716,110	\$2,860,183	\$572,037
	Multi-Use	16	\$1,053,607	\$1,053,607	\$2,107,214	\$421,443
	Residential	420	\$64,705,607	\$32,352,804	\$97,058,411	\$19,411,682
	Total	949	\$82,976,270	\$51,195,503	\$134,171,773	\$26,834,355
Total County		2,052	\$218,607,497	\$154,454,188	\$373,061,685	\$74,612,337

Figure 4.21. Laramie County At-Risk Properties to 1% and 0.2% Annual Chance Flood



Map compiled 8/2012; intended for planning purposes only
 Data Sources: Laramie County, WYGISC, FEMA DFIRM 1/17/2007,
 Crow Creek LOMR from City of Cheyenne

Figure 4.22. City of Cheyenne At-Risk Properties to 1% and 0.2% Annual Chance Flood

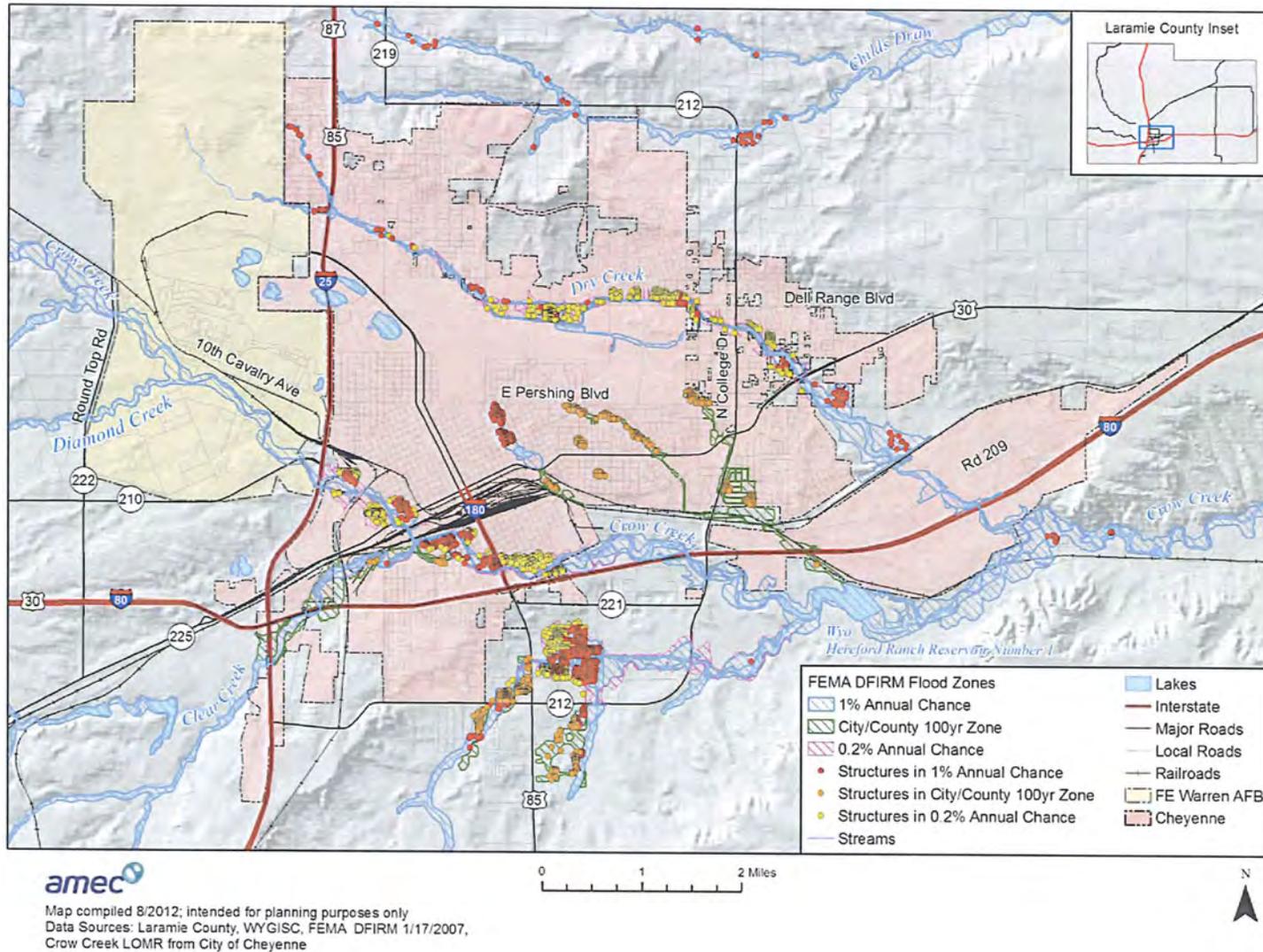


Figure 4.23. Town of Burns At-Risk Properties to 1% and 0.2% Annual Chance Flood

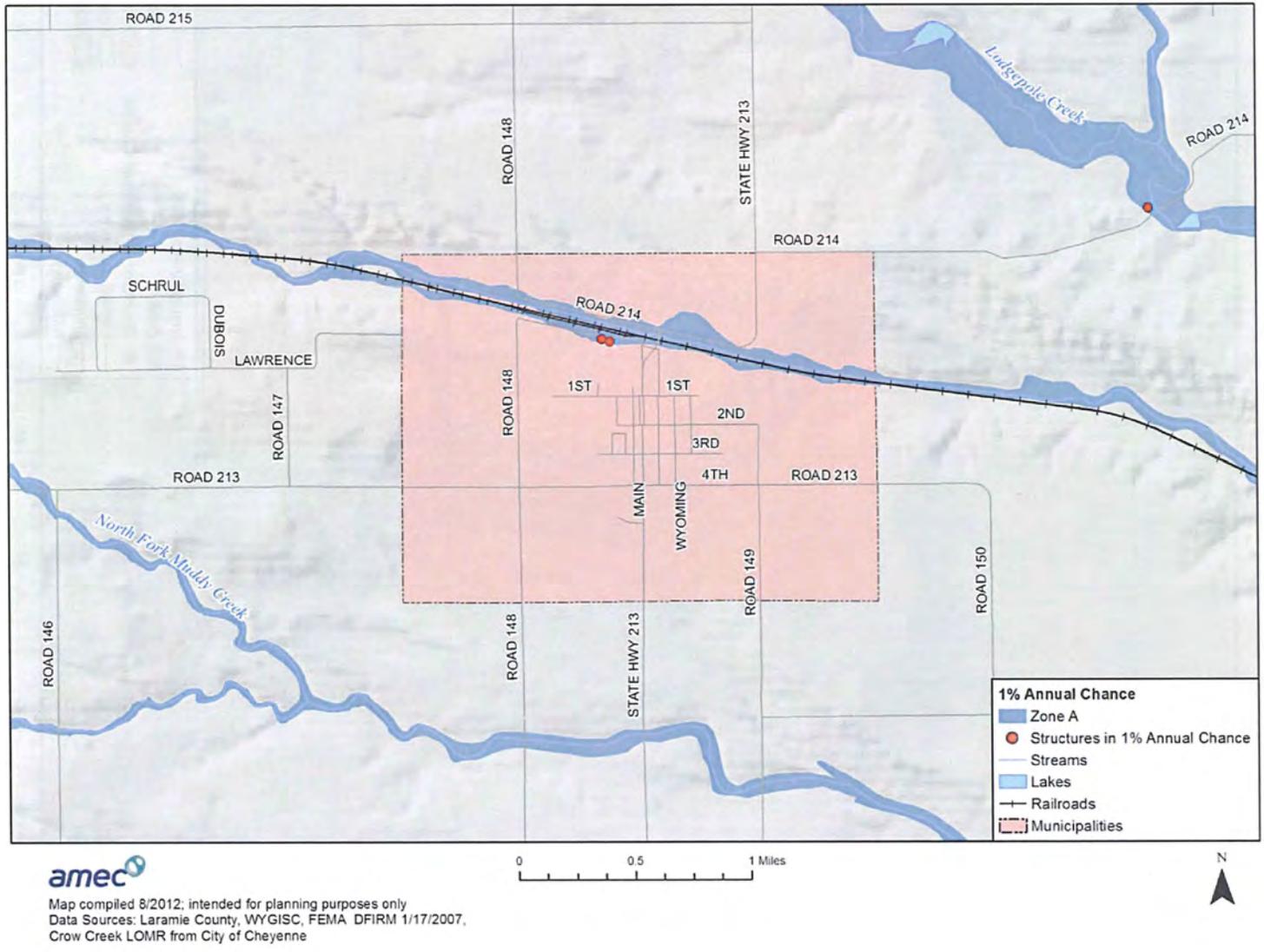
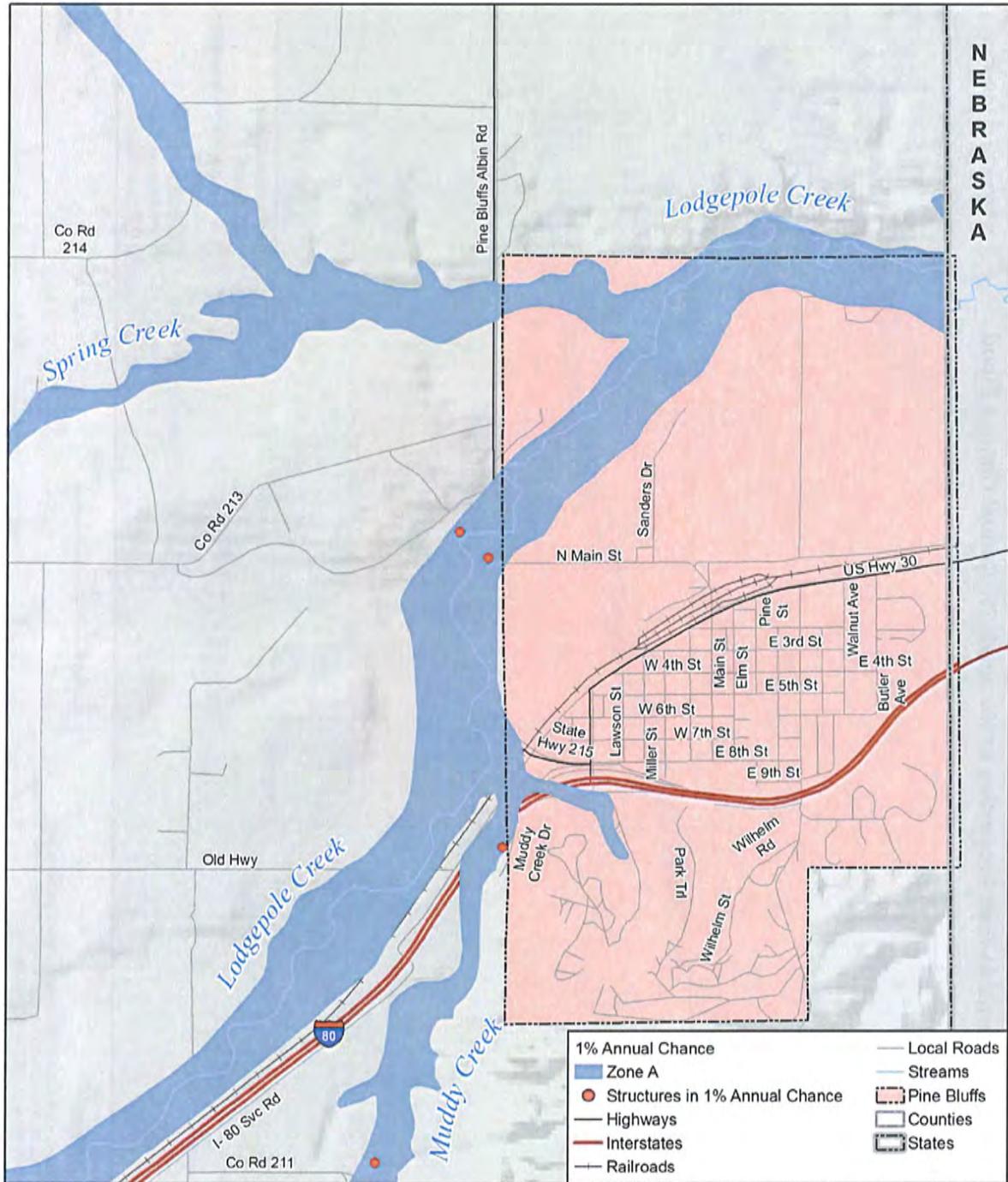


Figure 4.24. Town of Pine Bluffs At-Risk Properties to 1% and 0.2% Annual Chance Flood



Map compiled 8/2012; intended for planning purposes only
 Data Sources: Laramie County, WYGISC, FEMA DFIRM 1/17/2007,
 Crow Creek LOMR from City of Cheyenne

Urban Storm Drainage Studies

The City of Cheyenne has prepared several studies of the various drainage basins that could result in flood losses. Within the corporate limits of the City, there are ten drainage basins delineated. Master Drainage Plans were prepared for the City by CH2M Hill, et. al in 1988. Flood control recommendations from the 1988 plans were revised by the City's Surface Water Drainage Committee in 2000. The City has developed flood damage estimates and urban drainage project recommendations for eight of its ten drainage basins. Summaries of the potential damage and flood control project costs are presented below based on the City of Cheyenne Hazard Mitigation Plan 2005. Some of the projects have been implemented since 2004, thus the property damage estimates are in need of revision. Revised project costs within each basin are estimated below and discussed further in Chapter 5 and Appendix A2 of this plan. Allison Draw information is not included here since the floodplains are outside the City.

Capitol Basin (Upper and Lower): The total estimated property damages due to flooding (100-year flood damages) for the City's Capitol basin is \$21,500,000 (2004 dollars). In the 2005 City of Cheyenne HMP, Capitol basin was not split into upper and lower sections. A new approach utilized in the 2012 plan update is to separate the basin into Upper and Lower. As part of the Capitol basin, the Upper Capitol drainage basin is also considered the City's highest priority for flood control. According to the 2005 City of Cheyenne HMP, a 2004 City revised list of recommended flood control projects for the Lower Capitol basin was estimated to cost \$11,303,000 (2004 dollars). Adjusting for inflation at a rate of 1.2, the estimated cost in 2012 would be \$13,564,000. The upper Capitol Basin project is estimated to cost an additional \$12,000,000 (2012 dollars).

Clear Creek Basin: The total estimated property damages due to flooding (100-year flood damages) for the City's Clear Creek basin is \$5,376,000 (2004 dollars). According to the 2005 City of Cheyenne HMP, a 2004 City revised list of recommended flood control projects for the Clear Creek Basin was estimated to cost \$6,856,000 (2004 dollars). The estimated cost in 2012 would be \$8,227,000 using an adjustment for inflation factor of 1.2.

Crow Creek Basin: The total estimated property damages due to flooding (100-year flood damages) for the City's Crow Creek basin is \$12,859,200 (2004 dollars). According to the 2005 City of Cheyenne HMP, a 2004 City revised list of recommended flood control projects for Crow Creek Basin was estimated to cost \$12,608,000 (2004 dollars). Adjusting for inflation at a rate of 1.2, the estimated cost in 2012 would be \$15,130,000. However several flood hazard mitigation projects have been completed in the Crow Creek basin, reducing the cost estimate to \$12,137,000.

Dry Creek Basin: The total estimated property damages due to flooding (100-year flood damages) for the City's Dry Creek basin is \$11,088,000 (2004 dollars). According to the 2005 City of Cheyenne HMP, a 2004 City revised list of recommended flood control projects for the Dry Creek Basin was estimated to cost \$14,656,000 (2004 dollars). Adjusting for inflation at a

rate of 1.2, the estimated cost in 2012 would be \$17,587,000. However several flood hazard mitigation projects have been completed in the Dry Creek basin, and several projects added, reducing the cost estimate to \$15,402,000.

Holliday Basin: The total estimated property damages due to flooding (100-year flood damages) for the City's Holliday basin is \$1,390,000 (2004 dollars). The 2000 Surface Water Drainage Committee flood control project recommendations are estimated to cost \$2,750,000 (2004 dollars). According to the 2005 City of Cheyenne HMP, a 2004 City revised list of recommended flood control projects for the Holliday basin was estimated to cost \$2,002,000 (2004 dollars). Adjusting for inflation at a rate of 1.2, the estimated cost in 2012 would be \$2,402,000.

Henderson & East Lincolnway Basins: The total estimated property damages due to flooding (100-year flood damages) for the City's Henderson & East Lincolnway basin is \$11,240,000 (2004 dollars). According to the 2005 City of Cheyenne HMP, a 2004 City revised list of recommended flood control projects for the Henderson and E. Lincolnway basin was estimated to cost \$8,000,000 (2004 dollars). Adjusting for inflation at a rate of 1.2, the estimated cost in 2012 would be \$9,600,000. Several flood hazard mitigation projects have been completed, and a couple of projects have been added in the Henderson and E. Lincolnway basin, increasing the cost estimate to \$18,576,000.

NFIP Claims Analysis

Potential flood losses can also be gauged based on flood insurance claims history. Laramie County has been a participant in the National Flood Insurance Program (NFIP) since 1980. The county currently has 119 policies in force, adding up to \$20,918,400 in insurance coverage. 105 policies are for single family residences, one policy covers a 2-4 family residence, two policies cover "all other" residential homes, and the remaining eleven policies cover non-residential buildings. 30 policies are located in an A Zone, 34 policies are in A01-30 or AE Zones, one is in an AO Zone, one is in an AH zone, and 53 are in B, C, or X Zones. Eight claims have been paid in the county's NFIP history for a total of \$150,547 losses paid. There have been two substantial damage claims. Two repetitive loss buildings are located in unincorporated Laramie County. Repetitive loss properties refer to NFIP-insured structures that have had at least two paid flood losses of more than \$1,000 each in any ten year period since 1978. These properties are a nationwide priority to mitigate due to their repeated impacts on Flood Insurance funds. With 4 total repetitive loss claims, payments totaled \$33,970.

The City of Cheyenne, which joined the NFIP in 1977, has 363 NFIP policies and \$65,650,400 in insurance in force. 153 policies are located in A01-30/AE Zones, 43 policies are located in A Zones, and 167 policies are located in B, C, or X Zones. 98 losses have been closed and paid for a total of \$681,780, including four substantial damage claims since 1978. There are six repetitive loss properties in Cheyenne, with a history of 15 total repetitive flood loss claims.

Repetitive loss payments in Cheyenne totaled \$149,346. One of these properties has been responsible for 5 of the 15 loss claims, including \$81,401 in payments.

The Town of Burns and the Town of Pine Bluffs participate in the NFIP but do not have any policies currently in force. Albin does not have a mapped flood hazard area and does not participate in the NFIP at this time.

Critical Facilities and Community Assets

A GIS analysis of critical facilities within flood hazard zones in Laramie County indicates that there are fifteen facilities and/or community assets that are potentially exposed to flood hazards. Table 4.30 summarizes the facilities that are potentially at risk. All facilities are within the City of Cheyenne metropolitan area. Eleven of these facilities are identified within the 1% annual chance flood zone. Two within the flood zones are healthcare facilities and are identified as Cheyenne Endoscopy Center, and Mountain Towers Healthcare and Rehabilitation. Two Government entities within the 1% zone are the City of Cheyenne's Maintenance Shop and the city owned Neighborhood Facility. Three school structures are also identified within this zone, including Bain and Coke Schools, and Lighthouse Baptist Academy. These schools are not designated as shelters. Also located within the 1% annual chance flood zone are four childcare facilities. These include The Gingham Goose, Harvest Time Day Care, Kid's Korner Day Care, and Trinity Lutheran Preschool. Four structures are within the mapped 0.2% annual chance flood zone, including Health Reach, a healthcare provider; and La Petite Academy and Farmer in the Dell Daycare, both of which are childcare facilities. The Cheyenne/Laramie County Health Department, formerly within the 1% annual chance zone, is presently located within the 0.2% floodplain due to the Crow Creek LOMR changing the DFIRM zones. The location of critical facilities in relation to the floodplain is depicted in Figure 4.25 and Figure 4.26. See hazardous materials section for discussion on the risk to those facilities.

Table 4.30 Critical Facilities and Community Assets in the Floodplain

Structure	Facility Type	Location	Flood Zone
Harvest Time Daycare	Daycare	City of Cheyenne	1%
Kid's Korner Daycare	Daycare	City of Cheyenne	1%
The Gingham Goose	Daycare	City of Cheyenne	1%
Trinity Lutheran Preschool	Daycare	City of Cheyenne	1%
Maintenance Shop	Government	City of Cheyenne	1%
Neighborhood Facility	Government	City of Cheyenne	1%
Cheyenne Endoscopy Center	Healthcare	City of Cheyenne	1%
Mountain Towers Healthcare & Rehabilitation	Healthcare	City of Cheyenne	1%
Bain School	School	City of Cheyenne	1%
Cole School	School	City of Cheyenne	1%
Lighthouse Baptist Academy	School	City of Cheyenne	1%
Farmer in the Dell Daycare	Daycare	City of Cheyenne	0.2%
La Petite Academy	Daycare	City of Cheyenne	0.2%
Cheyenne/Laramie County Health Dept.	Government	City of Cheyenne	0.2%
Health Reach	Healthcare	City of Cheyenne	0.2%

Figure 4.25. Laramie County Critical Facilities in Flood Hazard Areas

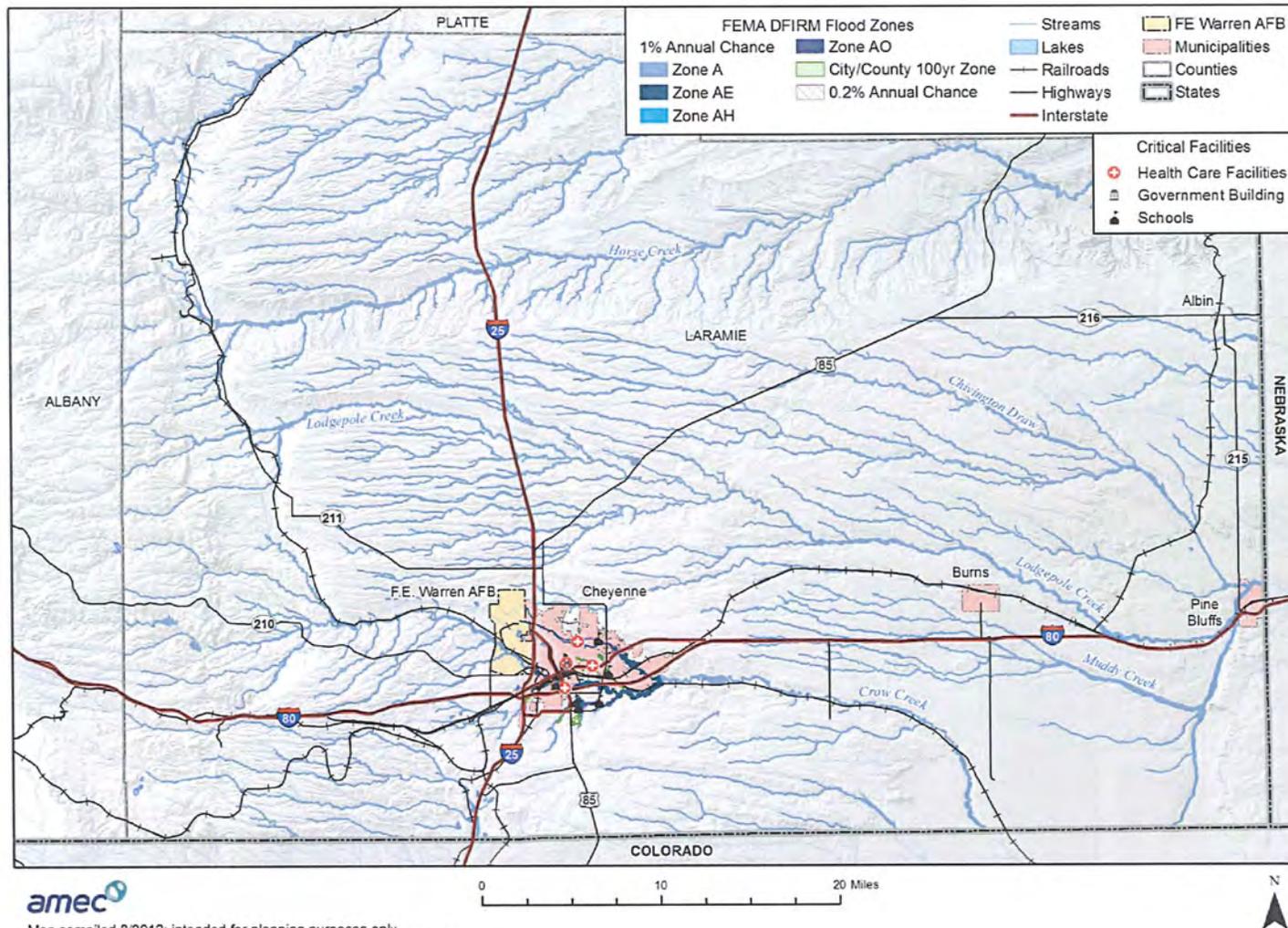
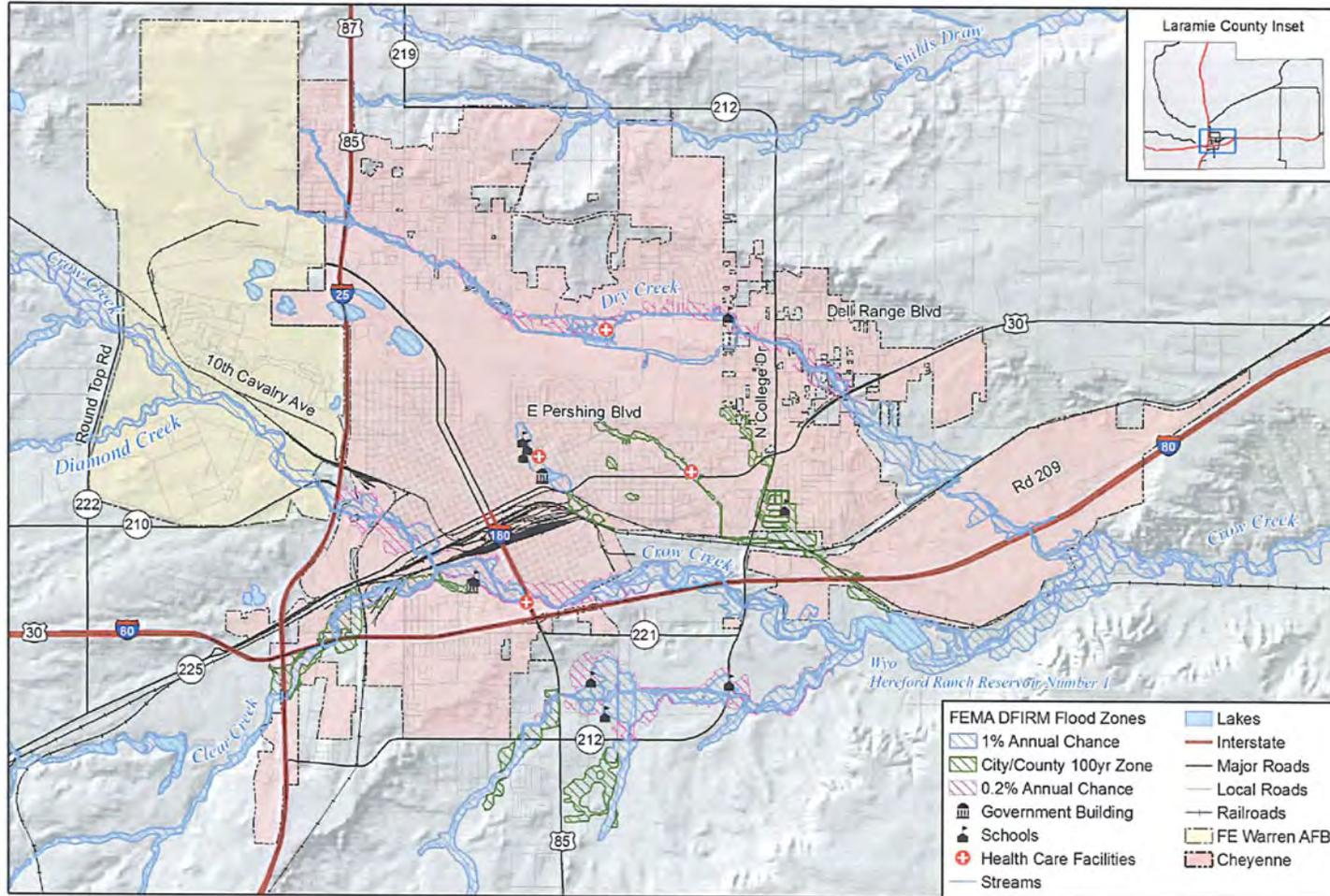


Figure 4.26. City of Cheyenne Critical Facilities in Flood Hazard Areas



Map compiled 8/2012; intended for planning purposes only
 Data Sources: Laramie County, WYGISC, FEMA DFIRM 1/17/2007,
 Crow Creek LOMR from City of Cheyenne

Natural, Historic, and Cultural Resources

Natural resources are generally resistant to flooding except where natural landscapes and soil compositions have been altered for human development or after periods of previous disasters such as drought and fire. Wetlands, for example, exist because of natural flooding incidents. Areas that are no longer wetlands may suffer from oversaturation of water, as will areas that are particularly impacted by drought. Areas recently suffering from wildfire damage may erode because of flooding, which can permanently alter an ecological system.

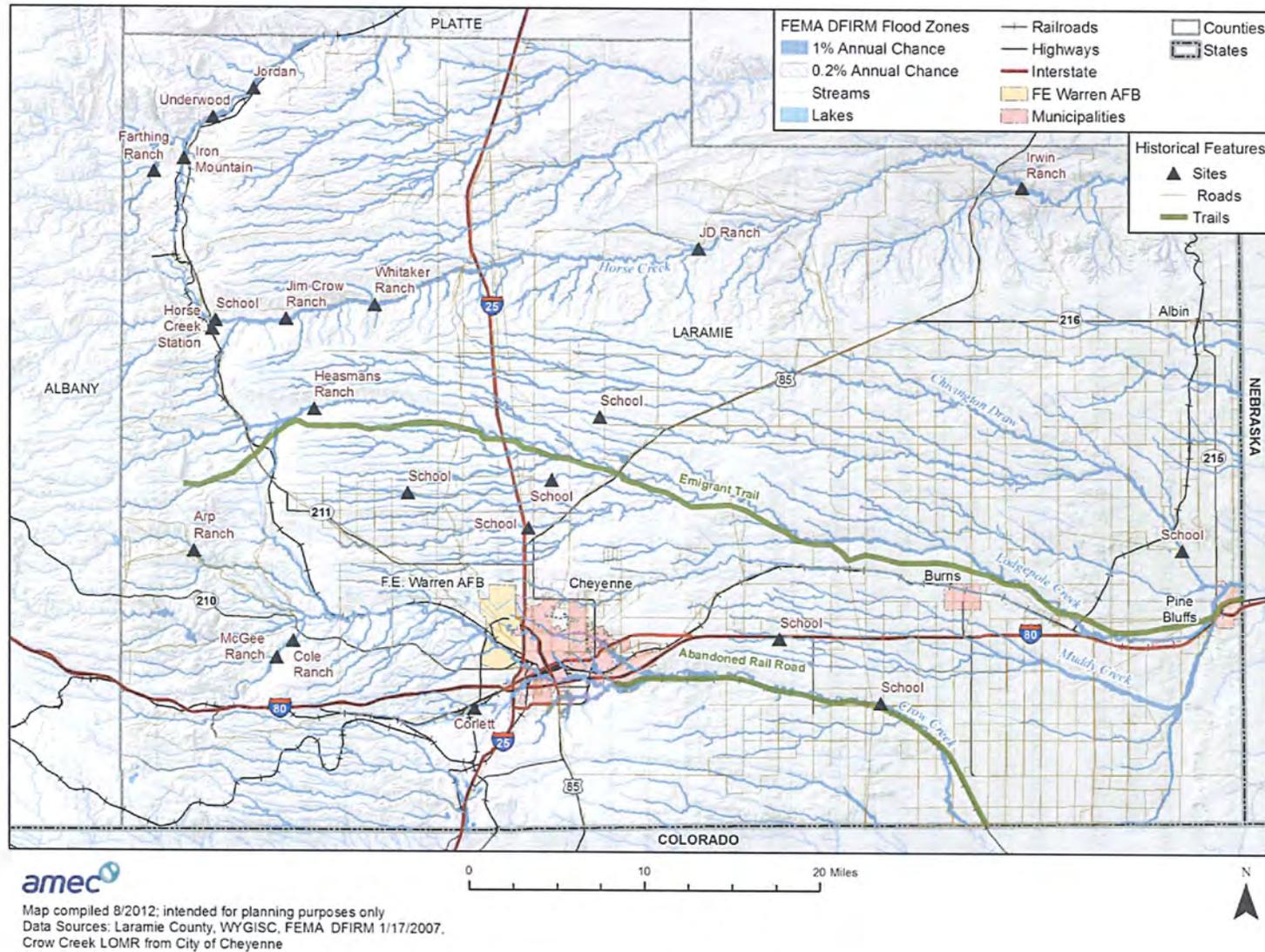
Several historical features are identified in either the 1% annual chance or 0.2% annual chance flood zone throughout Laramie County. The historical sites located within these flood zones include eight unnamed schools, and sections of the Emigrant Trail, and an abandoned rail road trail. Sections of approximately 160 named historical roads will be affected by such a flood event. Table 4.31 identifies other named sites located within the 1% annual chance flood zone. Figure 4.27 depicts the location of Laramie County historic sites in relation to the flood zones. All of these sites are located in unincorporated Laramie County.

Table 4.31 Historic Sites in the 1% Annual Chance Flood Zone

Historic Site	Type of Site
Jordan	Community/Stop
Underwood	Community/Stop
Iron Mountain	Community/Stop
Farthing Ranch	Ranch
Horse Creek Station	Community/Stop
Jim Crow Ranch	Ranch
Heasmans Ranch	Ranch
Arp Ranch	Ranch
Cole Ranch	Ranch
McGee Ranch	Ranch
Corlett	Community/Stop
Whitaker Ranch	Ranch
JD Ranch	Ranch
Irwin Ranch	Ranch

Source: County GIS with analysis by AMEC

Figure 4.27. Laramie County Historic Sites and Flood Hazards



Summary

Overall, flooding presents a **high risk** for Laramie County and the City of Cheyenne. It is a **low risk** in Burns and Pine Bluffs, and **not applicable** to Albin given the absence of a Special Flood Hazard Area.

PROPERTY AFFECTED: High

POPULATION AFFECTED: Moderate

PROBABILITY: Likely

JURISDICTION AFFECTED: County, City of Cheyenne, Town of Burns, Town of Pine Bluffs

4.2.7 Hailstorm

Hazard/Problem Description

Hailstorms are any storm events where hailstones fall. Hailstones, often abbreviated to 'hail,' forms when updrafts carry raindrops into extremely cold areas of the atmosphere where the drops freeze into ice. Hail falls when it becomes heavy enough to overcome the strength of the updraft and is pulled by gravity towards the earth. The process of falling, thawing, moving up into the updraft and refreezing before falling again may repeat many times, increasing the size of the hailstone. Usually hailstones are less than 2" in diameter, but have been reported much larger and may fall at speeds of up to 120 mph. Hailstorms occur throughout the spring, summer, and fall in the region, but are more frequent in late spring and early summer. These events are often associated with thunderstorms that may also cause high winds and tornadoes. Hail causes nearly \$1 billion in damage to crops and property each year in the United States. Hail is also one of the requirements which the National Weather Service uses to classify thunderstorms as 'severe.' If hailstones of more than one inch in diameter are produced in a thunderstorm, the storm qualifies as severe.

The National Weather Service classifies hail by diameter size and corresponding everyday objects to help relay scope and severity to the population. Table 4.32 indicates the hailstone measurements utilized by the National Weather Service.

Table 4.32 Hailstone Measurements

Average Diameter	Corresponding Household Object
.25 inch	Pea
.5 inch	Marble/Mothball
.75 inch	Dime/Penny

Average Diameter	Corresponding Household Object
.875 inch	Nickel
1.0 inch	Quarter
1.5 inch	Ping-pong ball
1.75 inch	Golf-Ball
2.0 inch	Hen Egg
2.5 inch	Tennis Ball
2.75 inch	Baseball
3.00 inch	Teacup
4.00 inch	Grapefruit
4.5 inch	Softball

Source: National Weather Service

Geographical Area Affected

Hailstorms occur during severe storms, which are regional in nature. However, just as the amount of precipitation in the form of snow or rain may vary significantly within a single storm, so may the amount, size, and duration of hail within a severe storm. This can have a wide range of impacts. In general, hail can fall anywhere in Wyoming. The southeast corner of Wyoming lies within the nation’s “Hail Alley.” Together with adjacent portions of Colorado and Nebraska, this region of Wyoming is battered by more hailstorms than any other part of the United States. Climatological data shows this area of Wyoming averaging five to nine days annually when hail is reported. The entirety of Laramie County lies within Hail Alley. Based on this information, the geographic extent rating for hailstorms is **significant**.

Past Occurrences

According to SHELDUS data, 79 damaging hail events occurred in Laramie County between 1960 and 2010. The 2011 Wyoming Multi-Hazard Mitigation Plan lists 143 hailstorms in Laramie County that occurred between 1926 and 2009. The 31 most damaging hail events (i.e. where damages equal or exceeded \$100,000) in Laramie County are shown in Table 4.33.

Table 4.33 Significant Damaging Hail Events in Laramie County: (1926-2009)

Date	Injuries	Deaths	Property Damages (\$)	Crop Damages (2009\$)
6/14/1926			140,000	
6/11/1944			500,000	
7/14/1948				100,000
6/21/1951			100,000	
6/18/1959				275,000

Date	Injuries	Deaths	Property Damages (\$)	Crop Damages (2009\$)
6/20/1962			275,000	
7/8/1964				275,000
6/6/1968			275,000	
6/10/1972			500,000	
6/16/1977			2,750,000	
6/16/1977			275,000	
6/18/1977			275,000	
7/14/1977			275,000	
7/31/1978			9,000,000	
7/30/1979			2,500,000	
7/24/1981				275,000
8/6/1981				5,000,000
8/1/1985			65,000,000	
6/8/1986				275,000
7/31/1986			275,000	
8/3/1987			2,750,000	
8/3/1987			2,750,000	
8/3/1987			37,000,000	
8/4/1987				175,000
7/13/1996			1,000,000	
7/13/1996			4,000,000	
7/30/1996				300,000
7/31/1996			3,400,000	
8/29/1996			2,400,000	
5/10/1998				149,700
8/26/2002			30,000,000	
TOTALS			165,440,000	6,824,700

Source: 2011 Wyoming Multi-Hazard Mitigation Plan, SHELDUS

Multiple damaging hailstorms also impacted the City of Cheyenne over the past several decades. A hailstorm occurred on the afternoon and evening of June 11, 1944 in Laramie and southern Goshen Counties. This storm struck the City of Cheyenne resulting in approximately a half-million dollars property damage in the city alone which was covered by insurance, and a great deal more uncovered. This storm is probably the most destructive that ever visited Cheyenne. There were many stones in the city larger than baseballs, and at Archer, seven miles east of Cheyenne, individual stones were reported to be as much as six inches in diameter, and some clusters were much larger. Stones were mostly the shape of door knobs, though some were nearly spherical. One large stone was cut into halves that showed 18 concentric circles. The principal damage resulted to windows, roofs, automobile tops and glasses, and neon signs. Not a single neon sign escaped destruction. Damage to crops in the adjacent area amounted to many thousands of additional dollars. Total damages were estimated at \$500,000 in 1944 USD.

A heavy thunderstorm on June 10, 1972 with 0.75-inch diameter hail at 1955 MST and 1.5-inch hail at 2030 MST did \$500,000+ damage to roofs, cars, windows, trees, shrubbery, gardens, and signs.

On June 16, 1977, a mile wide strip of hail one to two inches in diameter cut across Cheyenne from northwest to southeast with much damage along the center of the strip to houses, cars, trees, gardens, etc.

On July 31, 1978, two thunderstorms did considerable damage to parts of Cheyenne. Hail up to three inches in diameter did an estimated \$9.0 million (\$35.32 million in 2011 USD) in damage to homes, property, and vehicles.

On July 30, 1979, an extremely large and intense thunderstorm moving through the Cheyenne area caused extensive hail damage to cars, homes, and city buildings. Hail up to two inches in diameter was verified in town with reports of baseball-sized hail south of the city. Damage was in excess of \$2.5 million (\$7.8 million in 2011 USD), as reported by the Wyoming Tribune Eagle. State Farm Insurance reported more than \$3.2 million in claims for the event, and the State of Wyoming All-Hazard Mitigation Plan from December 1999 reported that \$16.5 million in damage may have occurred during the storm. The \$16.5 million figure was obtained from the Western Insurance Information Service, and may have included damage from Fort Collins, Colorado.

On August 1, 1985, a nearly stationary severe thunderstorm produced the most damaging flash flood on record for Cheyenne and the state. Twelve people lost their lives, 70 were injured, and damage to homes, cars, and businesses was estimated at \$65 million (\$136.44 million in 2011 USD). At the National Weather Service Forecast Office near the airport, 6.06 inches of rain fell in just over three hours. By 1930 MST, in addition to blinding rain, hail up to two inches in diameter and winds to 70 mph were occurring in the Cheyenne area. Many streets turned into 2- to 4-inch deep rivers with large amounts of hail floating on top. Basements of homes and businesses quickly filled up with water and hail as flood waters crashed through doors and

windows. Some basements equipped with drains were flooded with two to five feet of hail after the water drained away. In some areas of Cheyenne the hail had piled up into four to eight foot drifts.

On August 3, 1987, a hailstorm hit Cheyenne with 0.5- to 2-inch diameter hail. This storm heavily damaged cars at three major car dealerships west of downtown. Many of the cars were severely dented, with numerous broken or cracked windshields. Another hard hit area was F.E. Warren Air Force Base, where numerous vehicles were dented and windows shattered or broken. Three people were slightly injured during the hailstorm. The damage was estimated at \$37 million (almost \$69.67 million in 2011 USD).

A hailstorm on July 13, 1996 caused an estimated \$4,000,000 in the Cheyenne area. Damage was done to windows, roofs, and trees.

On July 31, 1996, hail between 1 and 2.5 inches fell in Cheyenne and caused \$3,400,000 in property damage.

A hailstorm on August 29, 1996 produced large hail that broke some car windows in Cheyenne and damaged numerous roofs.

On August 26, 2002, \$30 million (\$30.9 million in 2011 USD) in hail damage occurred in Cheyenne. Hail from one inch up to 2.75 inches in diameter fell over the central and western parts of Cheyenne. Significant wind damage to automobiles and roofs was reported.

Frequency/Likelihood of Occurrence

According to SHELDUS data, 79 damaging hail events occurred in Laramie County between 1960 and 2010. The 2011 Wyoming Multi-Hazard Mitigation Plan lists 143 damaging hailstorms in Laramie County that occurred between 1926 and 2009. The probability equations for these datasets are expressed as:

$$\frac{79}{50} \times 100 = 100\%$$

$$\frac{143}{83} \times 100 = 100\%$$

Based on this data, there is a 100% chance that a damaging hailstorm will occur in Laramie County in any given year. This corresponds to a probability rating of **highly likely**.

Potential Magnitude

The 2011 Wyoming Multi-Hazard Mitigation Plan ranks Laramie County as first in the state for damages from hailstorms. Between 1926 and 2010, Laramie County suffered \$385,194,457 (in 2011 dollars) in damages from hail. Given a span of 84 years between 1926 and 2010, this averages out to approximately \$4,445,309 in damages per year.

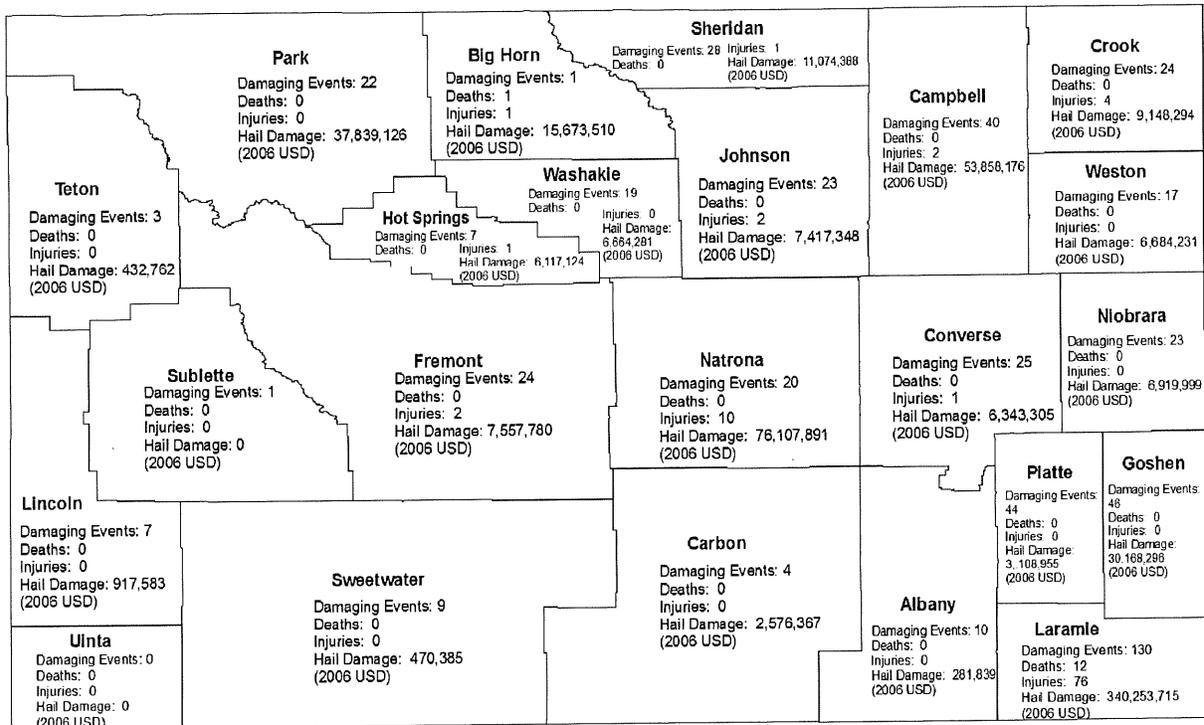
The 1985 event serves as the event of record. Coupled with the most severe flooding in Wyoming’s history, this storm claimed the lives of twelve people and injured 70 others. This event alone caused an estimated \$65,000,000 in damages (1985 dollars), mostly to homes, vehicles, and businesses. It is important to note that the damages from the 1985 event were due to a combination of flooding and hail, not hail alone. Therefore, the damage from hail alone would have been lower than the \$65 million estimate. The 2011 Wyoming Multi-Hazard Mitigation Plan estimates that the potential worst case hailstorm could result in \$120,540,000 today. The potential magnitude of a hailstorm in Laramie County could be **critical**.

Figure 4.28. Hail Accumulation from 1985 Hailstorm



Source: 2011 Wyoming Multi-Hazard Mitigation Plan

Figure 4.29. Statewide Hail Damages Sustained as of 2006 (\$ values based on years of event)



Wyoming State Totals:
 Damaging Events: 554
 Deaths: 13
 Injuries: 99
 Hail Damage: 633,533,522

Source: 2011 Wyoming Multi-Hazard Mitigation Plan



Vulnerability Assessment

Population

Risk from hail is uniform across the entire population of the county, but the greatest population exposure is in and around the City of Cheyenne. Particularly large hailstones could cause injuries. Hail can also make travel difficult or dangerous and potentially cause accidents.

General Property

In general, all crops, buildings, and vehicles in Laramie County are to some degree vulnerable to hail damage. Please refer to Table 2.4 in Section 2 Community Profile for values and building counts of structures exposed to hail in the county.

Damaging hail typically does not affect the entire county in one event. Hail is a geographically isolated event that affects only several square miles at any one time. In terms of property losses, the actual damages will depend on the housing density and density of automobiles in the

impacted area. This is highly variable across the county. In terms of crop losses, the actual damages that occur will depend on the type of crop and the growth stage of the plants when the hail occurs. A hailstorm in a rural area in the early spring when the plants are just emerging will have much less of an impact than a storm of the same intensity occurring later in the growing season when the plants are more susceptible to damage and when there is no time to replant if the crop is a total loss. Based on the 1985 event of record, a single extreme event may cause \$65,000,000 dollars in damages. However, the damage from the 1985 was also caused by severe flooding, so damages from just hail would probably be lower than that estimate. The county may also expect \$4,445,309 in damages in any given year, based on the average annual damages calculated in *Potential Magnitude*.

Essential Infrastructure, Facilities, and Other Important Community Assets

Essential buildings and utility lines could be damaged by hail or broken tree branches. Dangerous road conditions following a hailstorm could also make it difficult for emergency personnel to travel and perform their jobs.

Natural, Historic, and Cultural Resources

Endangered species and plants can sustain damage or injury from hailstones. Historic and cultural resources experience the same vulnerability as general property and essential facilities, and could suffer structural damage from hail depending on the nature of construction.

Summary

Overall, hailstorms are a **high** significance hazard to Laramie County, Cheyenne, Albin, Burns, and Pine Bluffs.

PROPERTY AFFECTED: High

POPULATION AFFECTED: High

PROBABILITY: Highly Likely

JURISDICTION AFFECTED: County and all jurisdictions

4.2.8 Hazardous Materials

Hazard/Problem Description

A general definition of hazardous material is: A substance or combination of substances which because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious, irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential

hazard to human health or environment when improperly treated, stored, transported, disposed of or otherwise managed.

The U.S. Department of Transportation, which has control over transported hazardous materials, uses the following definition: Hazardous material means a substance or material that the Secretary of Transportation has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and has designated as hazardous under section 5103 of Federal hazardous materials transportation law (49 U.S.C. 5103). The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (see 49 CFR 172.101), and materials that meet the defining criteria for hazard classes and divisions in part 173 of subchapter C of this chapter. The U.S. DOT has nine classes of hazardous material (not counting a miscellaneous subsection):

- Explosives
- Compressed Gasses (Flammable Gasses; Non-Flammable Compressed Gasses)
- Poisonous Gasses
- Flammable Liquids: Flammable (Flash Point Below 141 degrees); Combustible (Flash Point 141 degrees – 200 degrees)
- Flammable Solids
 - Flammable Solids; Spontaneously Combustible; Dangerous When Wet
- Oxidizers and Organic Peroxides: Oxidizer; Organic Peroxide
- Toxic Materials: Material that is Poisonous; Infectious Agents
- Radioactive Material
- Corrosive Material: Destruction of Human Skin; Corrode Steel at a Rate of 0.25 Inches Per Year
- Miscellaneous

A transportation incident refers to accidental and uncontrolled releases of chemicals or other hazardous materials during transport (i.e., highways, pipelines, and airways). Trains and fuel trucks traveling through the county are of particular concern in regard to transportation incidents. Weather in Laramie County can increase the risk that a hazardous materials incident will occur. Laramie County is subject to very high winds capable of tipping over large trucks. Trucks often have to stop in or around the City of Cheyenne if the NWS issues a high wind advisory or if roads are closed during severe winter storms.

A fixed-facility incident is an uncontrolled release of chemicals or other potentially hazardous materials from a facility. Fixed facilities include companies that store hazardous waste at their facility and also all hazardous waste sites. Begun in 1988, the Toxics Release Inventory (TRI) is a federal program established by the U.S. Environmental Protection Agency that contains information on releases of nearly 650 chemicals and chemical categories from industries including manufacturing, metal and coal mining, electric utilities, and commercial hazardous waste treatment, among others. TRI facilities are required to file reports of their disposal or

other environmental releases as well as other waste management quantities of regulated chemicals if they manufacture, process, or otherwise use more than the established threshold quantities of these chemicals. Table 4.34 includes a list of facilities in Laramie County that report to the TRI.

Table 4.34 TRI Reporting Facilities in Laramie County

County	Site
Laramie	Airgas Carbonic and Dry Ice, Inc.
Laramie	American Wyott Corporation
Laramie	Crafco, Inc.
Laramie	F.E. Warren Air Force Base
Laramie	Frontier Refining, Inc.
Laramie	Knife River Cheyenne
Laramie	Mountain States Materials
Laramie	Schroll Cabinets
Laramie	Tetra Micronutrients, Inc.
Laramie	US Department of Defense/US Air Force/Wyoming Air National Guard

Source: Environmental Protection Agency (EPA)

Laramie County has 77 Tier II facilities that have reported to the Local Emergency Planning Committee (LEPC) within the past five years. 47 of those facilities reported to the LEPC in 2011. The remaining 30 facilities reported to the LEPC on and off since 2007. All 77 facilities are listed in Table 4.36.

Note: The TRI does not cover all toxic chemicals that have the potential to adversely affect human health or the environment. The data does not include emissions from mobile sources nor releases of pesticides, volatile organic compounds, or fertilizers from many nonindustrial sources.

The U.S. Environmental Protection Agency also has responsibility for hazardous materials, chemicals, and wastes that have the potential to be released into the environment through stationary facilities. The Environmental Protection Agency (EPA) addresses through the Resource Conservation and Recovery Act (RCRA), the need for facilities with hazardous waste substances to store containers in some kind of containment system. Stationary containers, such as tanks, as well as portable storage containers, such as 55-gallon drums, are required to have a system that will protect the environment from this waste if a leak were to occur. Hazardous waste regulations appear in Title 40 of the Code of Federal Regulations. Portable container containment is addressed under Subpart I, Use and Management of Containers (EPA 40 CFR 264.175). Facilities dealing with the storage of hazardous materials may also be required to have containment if they are to meet the Uniform Fire Code (UFC) standards. Within the UFC standards, Section 80, Division III refers to Hazardous Materials Storage Requirements pertaining to containers and tanks and Division IV refers to Spill Containment with regard to hazardous materials.

The Emergency Planning and Community Right-to-Know Act (EPCRA) requires certain regulated entities to report information about hazardous chemicals and substances at their facilities to Federal, state, and local authorities. The objective is to improve the facilities, or government agency's ability to plan for and respond to chemical emergencies, and to give citizens information about chemicals present in their communities. The President has issued Executive Orders to Federal agencies that mandate their compliance with certain EPCRA requirements. Part of EPA's mission is to ensure that Federal facilities comply with these requirements. Sections 301 and 303 of EPCRA mandate the creation of two organizations; The State Emergency Response Commission (SERC) and the Local Emergency Planning Committee (LEPC). Sections 311-312 of EPCRA require facilities to submit material safety data sheets or Tier II forms (lists of hazardous chemicals on-site (above threshold quantities)) to SERC's, LEPC's, and local fire departments.

There is a Risk Management Program in addition to EPCRA. When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n):

- Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases;
- Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and
- Emergency response program that spells out emergency health care, employee training measures, and procedures for informing the public and response agencies (e.g. the fire department) should an accident occur.

By June 21, 1999, a summary of the facility's risk management program (known as a "Risk Management Plan" or "RMP") was to be submitted to EPA, which will make the information publicly available. The plans must be revised and resubmitted every five years.

The Risk Management Program is about reducing chemical risk at the local level. This information helps local fire, police, and emergency response personnel (who must prepare for and respond to chemical accidents), and is useful to citizens in understanding the chemical hazards in communities. EPA anticipates that making the RMPs available to the public stimulates communication between industry and the public to improve accident prevention and emergency response practices at the local level.

The Occupational Safety and Health Administration (OSHA), established under the Department of Labor by the OSHA Act of 1970, regulates the storage and use of toxic and hazardous

substances as they relate to worker health and safety. OSHA regulations are found in Title 29 of the Code of Federal Regulations (CFR), Part 1910, Subpart H.

Laramie County is susceptible to accidents involving hazardous materials on roads, railroads, highways, and at fixed facilities that manufacture, use, or store dangerous chemical substances. A hazardous materials incident may occur at any time during routine business operations or as a result of a natural hazard. The release of hazardous materials can threaten people and natural resources in the immediate vicinity of the accident. Air releases can prompt large-scale population evacuations; spills into water or onto the ground can adversely affect public water and sewer systems.

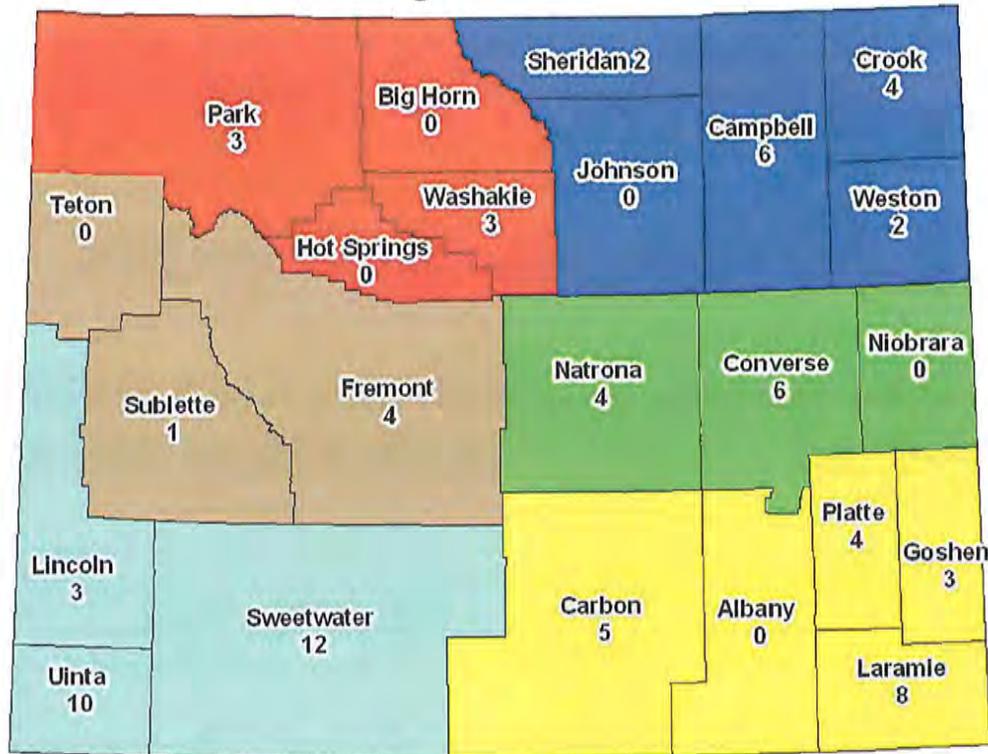
Primary issues of concern include chemicals used for agricultural purposes, such as pesticides and insecticides; chemicals used in water and wastewater treatment; chemicals used in mining and explosives; materials transported along the Burlington Northern Santa Fe and Union Pacific rail lines; federally regulated pipeline transportation systems; gas-fired residential appliances; and other miscellaneous examples. Certain facilities keep specific hazardous materials in storage, depending on the function of the facility.

Geographical Area Affected

A **significant** portion of the planning area is affected by hazardous materials threats. Unincorporated and incorporated areas of Laramie County are threatened by potential hazardous materials incidents. The City of Cheyenne is especially at risk given its proximity to major transportation corridors. Interstate 80, Interstate 25, and two major rail lines pass through Cheyenne. The rail-switch yards for the two rail lines are located within the main business and residential areas of the City. Pine Bluffs and Burns are located in close proximity to I-80 and the Union Pacific Railroad transportation system corridors.

There are some facilities that contain extremely hazardous substances. Those are the facilities that are required to generate Risk Management Plans. An accident resulting in the release of chemicals from those facilities could pose a significant problem to local jurisdictions and the State of Wyoming. Figure 4.30 indicates the distribution of Risk Management Plan facilities in each county in Wyoming.

Figure 4.30. Number of Facilities with Risk Management Plans by County



Source: 2011 Wyoming Multi-Hazard Mitigation Plan

A listing of the facilities and chemicals present in Laramie County is presented in Table 4.35 below. This information was derived from the 2011 Wyoming HMP. Table 4.36 presents a more comprehensive list of facilities in Laramie County that reported hazardous materials or chemicals since 2007. It does not specify which hazardous materials or chemicals were reported by each facility. There are some potentially significant problems that could develop in Laramie County if select chemicals in Table 4.35 are released.

Table 4.35 Risk Management Plan (RMP) Facilities and Associated Chemicals in Laramie County

County	Site	Chemical
Laramie	Airgas Carbonic and Dry Ice, Inc.	Argon, Nitrogen, Carbon Dioxide
Laramie	Cheyenne Board of Public Utilities – Dry Creek Plant	
Laramie	Cheyenne Dry Creek Water Treatment Plant	
Laramie	Cheyenne Terminal	
Laramie	Crow Creek Wastewater Facility	
Laramie	Dyno Nobel, Inc.	Ammonia, Chlorine
Laramie	Farmers Elevator Company	Ammonia
Laramie	Frenchman Valley Coop	

County	Site	Chemical
Laramie	Frontier Refining Inc. Cheyenne Refinery	Chlorine, Flammable
Laramie	Kaneb Pipeline	
Laramie	Pipeline Warehouse	
Laramie	Ray L. Sherard Water Treatment Plant	Chlorine
Laramie	Roundtop Water Treatment Plant	Chlorine
Laramie	Silo Plant	Flammable
Laramie	Suncor Energy, Inc.	
Laramie	Wal-Mart Distribution Center #7077	Anhydrous Ammonia

Source: 2011 Wyoming Multi-Hazard Mitigation Plan and EPA

Table 4.36 Facilities Reporting Hazardous Materials in Laramie County: 2007-2011

Facility	City	2007	2008	2009	2010	2011
Airgas Intermountain, Inc.	Cheyenne	X	X	X		X
Amerigas	Cheyenne	X	X		X	X
American WYOTT Corporation	Cheyenne		X			X
AT&T Inc.	Cheyenne	X	X	X		X
Baker Petrolite	Cheyenne	X				
Bill Barrett Corporation	Cheyenne					X
Board of Public Utilities	Cheyenne	X		X		X
Centennial Ag Supply	Pine Bluffs			X	X	
Champ, LLC	Albin		X	X		X
Cheyenne Switch/POP (Sprint)	Cheyenne	X		X	X	
Cheyenne Travel Center	Burns	X				
Cheyenne U-Pump-It (Peerless Tyre Co.)	Cheyenne	X	X	X		
Cheyenne VA Medical Center	Cheyenne	X	X			
Coral Production Corp.		X	X	X	X	X
CRAFCO	Cheyenne					X
Croell Redi-Mix, Inc	Cheyenne				X	
DNR Oil & Gas Inc.	Cheyenne			X	X	
Delta Petroleum Corp		X	X			
Denbury Onchore, LLC	Pine Bluffs					X
Department of Veterans Affairs Medical Center	Cheyenne			X	X	
Dyno Nobel Inc.	Cheyenne	X	X	X	X	X
Eastern Laramie county Solid Waste Disposal District	Burns					
Echostar satellite L.L.C.	Cheyenne	X	X	X	X	X
Ellenbecker Oil Inc.						
Emerald Foam Control, LLC (was Lubrizol Performance)	Cheyenne	X	X	X	X	X

Facility	City	2007	2008	2009	2010	2011
F.E. Warren AFB	Cheyenne	X	X	X	X	X
Holly / Frontier Refining Inc. Cheyenne refinery	Cheyenne	X	X	X	X	X
Gases Plus	Cheyenne	X	X	X	X	X
General Shale Brick, Inc. Plant #62	Cheyenne					X
HD Supply Construction Supply	Cheyenne	X	X	X	X	X
Home Depot	Cheyenne	X	X	X	X	X
Jebro Incorporated	Cheyenne					X
Jeld-Wen Window division - Cheyenne	Cheyenne	X		X	X	X
Kaiser-Francis Oil Co. Rohweder	Pine Bluffs	X	X	X	X	X
Knife River	Cheyenne			X	X	X
Laramie County School District #1	Cheyenne	X	X	X	X	
Level 3 Communications	Cheyenne	X	X	X	X	X
Little America - Cheyenne	Cheyenne	X	X		X	X
Lone Star Land & Energy	Cheyenne				X	
Lowe's	Cheyenne	X	X	X	X	X
LT Environmental / Noble Energy	Cheyenne				X	
MCI - CNZYWY (Verizon)	Cheyenne	X	X	X	X	X
MCI - HARRWY (Verizon)	Harriman	X	X	X		X
Morandin Concrete	Cheyenne	X				
National Weather Service	Cheyenne				X	
Nobel Energy	Cheyenne					X
Panhandle CO-OP	Burns	X	X	X	X	X
Panhandle CO-OP (LPG Bulk)	Cheyenne	X	X	X	X	X
Pilot Travel Center	Cheyenne					X
Plains Marketing, L.P. (Wyco Sinclair)	Cheyenne	X	X			
Qwest Corporation (Century Link)	Cheyenne	X	X	X	X	X
Rawlins Transload Location (Loves)	Cheyenne					
Rocky Mountain Products Pipeline	Cheyenne	X	X	X	X	X
RSC Equipment Rental	Cheyenne					X
Sam's Club #6430	Cheyenne	X	X	X		X
Simon Contractors dba Mountain States Materials	Cheyenne			X	X	
Sinclair #49005	Cheyenne	X		X		
Sinclair Truck Loading Station 4016	Cheyenne	X				
Sinclair Oil - Cheyenne Station	Cheyenne		X			X
SM Energy Co. (Oil Exploration)	Laramie County				X	X
Suburban Propane	Albany					
Texas American Resources	Granite Canyon				X	
Union Pacific RR - Cheyenne	Cheyenne	X	X			
United States Welding, Inc.	Cheyenne	X	X	X	X	X
Van Diest supply Company	Cheyenne	X	X	X	X	

Facility	City	2007	2008	2009	2010	2011
Vaughn Concrete Products, Inc.	Cheyenne			X	X	X
Verizon Wireless	Hillsdale	X	X	X		X
Wal-Mart Distribution	Cheyenne	X	X	X	X	X
Western Area Power Administration, Archer Substation	Cheyenne	X	X	X		X
Western Area Power Administration, Cheyenne Substation	Cheyenne	X	X	X	X	X
Western Area Power Administration, Pine Bluffs	Pine Bluffs	X	X	X	X	X
Western Area Power Administration, Warren	Cheyenne	X	X	X	X	X
Western Environmental Services	Cheyenne				X	X
Wyoming Air National Guard	Cheyenne	X	X		X	
Wyoming Department Of Transportation	Cheyenne	X	X		X	
Wyoming Department Of Transportation	Pine Bluffs	X	X		X	
Wyoming Machinery Company	Cheyenne	X		X		

Source: HMPC

Past Occurrences

Dozens of hazardous materials incidents occur in Laramie County in any given year. According to the “Wyoming State Emergency Response Commission (SERC) 2004 Annual Report”, there were a total of 22 hazardous material spills reported in Laramie County in 2004. This data was not updated with the 2011 SERC Annual Report. Hazardous materials incident data post-2004 was obtained from the National Response Center (NRC). This data, which includes 84 separate incidents, is summarized in Table 4.37. Most incidents occurred in the City of Cheyenne. Incident types varied among mobile, fixed, storage tank, pipeline, and railroad. Faulty equipment was one of the most common causes of hazardous materials incidents. The “Incident Details” column provides a transcript of each event as reported to the NRC.

Table 4.37 Hazardous Materials Incidents in Laramie County: 2005-2011

Date	Location (Nearest City)	Type of Incident	Incident Details
9/15/2011 13:50		Fixed	A release occurred from a vacuum truck hose being used to remove excess water from the sludge in the vacuum box.
9/13/2011 12:51		Fixed	During start up of caustic circulation in the new crude merox unit, the bypass valve around 25-LV-725B (disulfide separator stack level control valve) was in the open position. The open bypass valve drained the entire caustic level from the butane extractor and out the disulfide separator vent tank drain to the refinery sewer system. The refinery wastewater treatment operator was notified that approximately 350 gallons – 20 baume caustic was released to the sewer.
8/31/2011 22:00	Cheyenne	Storage Tank	The pumper at TK 1-18, the mobilized oil sludge coking (mosc) tank set the draw down rate of the material exiting the tank too aggressively and 20 gallons of mosc material

Date	Location (Nearest City)	Type of Incident	Incident Details
			was spilled onto the gravel within the tank dike area.
8/21/2011 10:09	Cheyenne	Fixed	Caller reported a relief valve lift causing a plant shutdown and a possible exceedance of reportable quantity.
8/14/2011 19:45	Cheyenne	Fixed	Caller stated due to a small leak in a pipe anhydrous ammonia released into the air.
6/5/2011 15:10	Cheyenne	Fixed	Caller reported a release of anhydrous ammonia from a carbamate pump due to equipment failure.
5/28/2011 6:30	Cheyenne	Fixed	Caller stated that there was a release of anhydrous ammonia from a compressor. The cause was due to equipment failure.
5/14/2011 2:40	Cheyenne	Fixed	Caller reported that a relief valve released anhydrous ammonia during a plant shutdown.
5/12/2011 13:30	Cheyenne	Mobile	Caller stated that there was a release of number 2 diesel from a cargo tanker. The cause was due to another vehicle running into the truck. There were no fires, injuries, or fatalities.
4/24/2011 13:20	Cheyenne	Railroad	The caller stated there was a diesel spill discovered on rail property. The source is unknown. The spill estimated to be up to 200 gallons which spreads approximately 250 miles.
4/23/2011 8:15	Cheyenne	Fixed	Possible anhydrous ammonia RQ exceedance due to bleeding down of a compressor. Water with ammonia is being drained into a ditch line due to the bleeding down.
4/3/2011 18:10	Cheyenne	Fixed	The caller reported that the RQ of ammonia was possibly exceeded due to an overpressure on a vessel.
3/14/2011 17:30	Cheyenne	Railroad Non-Release	Six molten sulfur cars derailed at a switch from a yard onto a main track. None of the cars are leaking.
1/22/2011 10:00	Cheyenne	Mobile	Caller stated that a tanker truck rolled over and the cargo area ruptured releasing diesel fuel onto the ground.
12/31/2010 6:30	Cheyenne	Fixed	The Caller reported that they had a plant shutdown. This caused an unknown amount of anhydrous ammonia released to the atmosphere. The plant was shut down due to equipment failure.
12/14/2010 2:00	Cheyenne	Fixed	Wastewater treatment plant operator was making his rounds and discovered a small leak in the tank.
9/21/2010 17:00	Cheyenne	Fixed	Caller stated that the company hauls asphalt and sprays the back of the trucks out with diesel. The company lets the material run out onto the soil. There are two locations where this occurs. This has been going on for years. This is also occurring at the asphalt hot plant on County Road 128A. Each time that the trucks are rinsed out it is about 1 gallon and they rinse them out about 50 times a day. The soil is saturated and the reporting party is concerned about the ground water and well water intrusion.
9/12/2010 18:25	Cheyenne	Fixed	Caller reported a release of anhydrous ammonia from a process vessel due to the safety relief valve lifted.
8/21/2010 20:50	Cheyenne	Railroad Non-Release	Report of an employee that was exposed to smoke inhalation inside the cab of a train. There was no fire reported.
8/17/2010 7:00	Cheyenne	Fixed	Caller reported that there was a release of anhydrous ammonia from the flash gas chiller due to an unknown cause.

Date	Location (Nearest City)	Type of Incident	Incident Details
8/15/2010 2:30	Cheyenne	Fixed	Release of material from a temporary tank due to equipment failure.
8/5/2010 0:11	Cheyenne	Railroad	Caller reported that 4 locomotives and 5 cars derailed due to unknown causes.
8/5/2010 0:11	Cheyenne	Railroad	Caller reported a discharge of diesel fuel from two locomotives as the result of a freight train derailment. Caller stated four locomotives and five rail cars derailed. Caller does not know what caused the derailment at this time. This is additional information to previous NRC report number 949974.
8/4/2010 5:00		Fixed	Operators noticed a leak in a suction line at approximately 5am this morning. The associated storage tank was isolated and soda ash used to neutralize the acid. The contaminated soil will be excavated and disposed of properly. Sulfuric acid is a cercla hazardous substance with a reportable quantity of 1,000 pounds. The initial estimate of the release was below the RQ, resulting in a delayed notification.
7/2/2010 15:00	Cheyenne	Mobile	Caller reported a discharge of 20-30 gallons from a storage drum in the back of a truck. This occurred at a truck stop.
6/30/2010 8:49	Cheyenne	Fixed	Caller reported a release of process steam containing nitric oxide and ammonia from a neutralizer due to a plant upset (an ammonia pressure problem).
6/14/2010 13:43	Cheyenne	Storage Tank	Caller reported a discharge of 25-50 barrels of crude oil from a storage tank when the tank was overfilled.
6/14/2010 12:00	Cheyenne	Fixed	Caller reported that the suspected responsible party is dumping oily materials as well as releasing Freon into the air.
6/6/2010 9:50	Cheyenne	PIPELINE	Caller reported a release of anhydrous ammonia from a 3 inch process pipeline that ruptured possibly due to mechanical failure. Caller stated that the release is still ongoing.
6/3/2010 0:30	Cheyenne	Fixed	Caller reported a release of hazardous waste (daf sludge, F038 hazardous waste) onto the ground due to maintenance work on the waste water treatment system.
5/26/2010 15:20	Cheyenne	Storage Tank	Caller reported that an old tank car was decommissioned and being broken down to be used for scraps; the used lubricating oil was removed and put in 55 gallon drums. A storm came through the area and blew the drums over causing a spill to the ballast and soil.
5/14/2010 20:30	Cheyenne	Fixed	Caller stated a compressor was lost due to high levels on a suction scrubber. Caller stated there may have been a possible release of anhydrous ammonia, which was undetermined.
4/26/2010 19:30	Cheyenne	Fixed	Caller reported a release of an unknown material (suspected ammonia) to the atmosphere from a relief valve at the facility. Too much pressure was the cause of the release.
3/25/2010 11:20	Horse Creek	Railroad	Caller stated there was a nine car freight train derailment which involved the spill of coal and damages over the \$150,000.00 amount.
3/10/2010 21:00	Cheyenne	Railroad Non-Release	Caller reported a 7 car derailment of a freight train due to unknown causes at this time. No hazmat in any of the cars

Date	Location (Nearest City)	Type of Incident	Incident Details
			that were derailed.
2/9/2010 9:40	Cheyenne	Storage Tank	Caller reported a release of propane from a storage tank at the tank farm due to a broken valve.
2/1/2010 13:49	Cheyenne	Railroad	A rail employee was cutting a coil pipe in an old tank car. While cutting, fumes ignited and burned the employee's chin, and the individual inhaled the fumes.
12/12/2009 17:00	Cheyenne	Storage Tank	There was a spill of an estimated volume of 600-700 gallons of sulfuric acid from a line break on a storage tank. The tank is next to one of the cooling towers. Ice that accumulated on the sides of the towers due to the cold weather fell and broke a line connected to the tank. The tank was filled early last week with 700 gallons. With the potential for chemical exposure around the tank, a true gauge has not been taken. Initial volume estimates over the weekend were low (below the RQ). The release is contained and the soil is being neutralized with soda ash.
11/20/2009 8:10	Cheyenne	Storage Tank	Release of material from a storage tank due to the tank releasing vapors.
8/13/2009 16:00	Cheyenne	Continuous	Caller reported a statistically significant increase of their upper bounds.
7/30/2009 9:55	Cheyenne	Storage Tank	The caller reported the release of materials into the atmosphere from a storage tank due to a malfunction of a relief valve.
4/10/2009 7:55	Cheyenne	Mobile	Caller reported a discharge of approximately 40 gallons of diesel fuel from a refer trailer fuel tank due to a single vehicle accident on Interstate 80 mile marker 340.
4/8/2009 11:30	Cheyenne	Fixed	Caller stated there was a spill of materials at the facility due to operator error as a chiller was overfilled. Caller stated the materials went from a black asphalt pavement to a concrete ditch then to a containment pond.
3/15/2009 10:30	Cheyenne	Mobile	Caller reported that F038 refiner sludge released from a vac truck while being transferred from one tank to another.
3/13/2009 4:25	Cheyenne	Storage Tank	F037 hazardous waste has spilled onto the soil from a failed above ground storage tank.
2/5/2009 16:37	Cheyenne	Continuous	The Caller reported a revision on a continuous release report. The ERNS number is 515173. The caller has a new upper bound on ammonia, which is 788 pounds per day.
1/28/2009 16:15	Chugwater	Mobile	A truck driver ran onto ice, lost control of the truck, ran into the median, and the truck rolled over. The driver was distracted by another accident in the median at the time.
12/27/2008 14:28		Railroad	Caller reported a ten car derailment of rail cars and a spill of materials.
8/12/2008 12:00	Cheyenne	Fixed	Caller reported that there is a refinery in the vicinity of their home that is doing drilling that releases large amounts of vapor into the air and it is affecting their health. The caller complained of dizziness and sickness as a result of the drilling.
7/23/2008 12:30	Cheyenne	Vessel	Caller reported that anhydrous ammonia released from a refrigerant drum relief valve due to a high liquid level in the vessel. As a result the material released into the atmosphere possibly exceeding the RQ.
7/8/2008 22:15	Cheyenne	Railroad Non-	One non-hazmat rail car has derailed on the Union Pacific

Date	Location (Nearest City)	Type of Incident	Incident Details
		Release	Railroad.
7/7/2008 20:35	Cheyenne	Fixed	The caller reported a release of ammonia to the air due to a lifted relief valve. The valve lifted due to a backup which was caused by a manually blocked valve.
5/6/2008 17:17	Cheyenne	Storage Tank	Caller reported a release of sludge (waste products) from a roll out box which failed while being loaded onto a truck for disposal.
3/19/2008 22:24	Laramie	Railroad Non-Release	Caller stated that a train struck a trespasser causing a fatality.
2/9/2008 12:00	Cheyenne	Fixed	Caller stated that the refinery had a blowout through the flaring tower onto a meadow, into the creek and irrigation ditch.
12/22/2007 15:15	Cheyenne	Fixed	The caller reported that red smoke is coming out of the flare stacks of a chemical plant. The caller reported that it is very unusual for the plant to be discharging red material. The caller also states that the material might be interfering with the caller's respiratory system.
12/13/2007 12:20	Cheyenne	Storage Tank	Caller reported a release of anhydrous ammonia from a storage tank due to the compressor going down.
10/23/2007 16:00	Albin	Mobile	Caller reported that 7,000 gallons of crude oil spilled onto the soil from a tanker truck when the truck accidentally left the road.
9/20/2007 17:50	Cheyenne	Railroad Non-Release	Caller reported a train derailment due to unknown causes at this time. Caller stated four rail cars on an auto train derailed as the result of a yard train (YCY60R OF THE 20TH) swiping into it. Time of incident: 1750 MST.
9/17/2007 12:00	Cheyenne	Fixed	Caller stated there are materials being dumped by a person in the neighborhood onto the ground.
9/12/2007 16:00	Cheyenne	Fixed	The caller reported a release of materials from a storage tank due to equipment failure.
7/27/2007 5:35	Cheyenne	Fixed	Caller reported a release of materials from the waste water treatment facility inside the Cheyenne rail yard. Caller stated that stormy weather caused an overflow.
7/16/2007 14:08	Cheyenne	Railroad	Caller reported a release of magnesium chloride from a tank car due to a misaligned valve which was open. The release went onto the ground. Caller stated that the city storm drains run under the rail yard which gives a possibility of the release reaching a storm drain.
5/19/2007 17:30	Cheyenne	Fixed	An anonymous caller reported a release of nitric acid. The cause of the release was due to a crack line on a well. It was reported that there was a white cloud in the facility that looked like steam.
4/19/2007 17:00	Cheyenne	Fixed	Caller reported that they were constructing a pipeline when they discovered condensate in a railroad pipeline ditch. The cause of the discharge is unknown.
2/17/2007 3:30	Cheyenne	Mobile	Caller reporting a single vehicle accident and roll over of a tractor trailer resulted in the spill of jet A fuel.
1/23/2007 13:00	F.E. Warren Air Force Base	Mobile	Caller stated there was a release of materials from a dump truck due to the truck bottoming out.
1/2/2007 8:45	Cheyenne	Fixed	Caller stated due to a broken line at the facility there was a release of materials.

Date	Location (Nearest City)	Type of Incident	Incident Details
12/19/2006 3:30	Cheyenne	Fixed	Caller stated due to a loss of a pump there was a spill of materials onto the ground.
11/11/2006 9:31		Pipeline	The caller reported that a pipeline (36 inch pipeline operated at 1,000 PSIG) was punctured by a third party due to unknown causes. This is causing a release of material. A fire also started and is still ongoing. The company is in the process of isolating the section.
11/9/2006 11:00	Cheyenne	Fixed	Caller stated that a mechanical failure caused a waste water treatment separator to overflow.
5/21/2006 17:35	Cheyenne	Fixed	The Caller stated that power failure affected unit operation causing a release of materials from a process unit.
5/1/2006 12:00	Cheyenne	Fixed	Caller stated there are materials dumped in an alley behind a residence. Caller does not know who is dumping the materials which has been going on for some time.
1/24/2006 6:45	Cheyenne	Fixed	Caller stated due to operator error there was a release of materials to the ground. A valve was left open and materials released onto the ground.
9/27/2005 10:05	Cheyenne	Mobile	Diesel fuel released from a fuel tank on a fueling truck due to human error.
9/18/2005 17:30	Cheyenne	Storage Tank	The caller stated that a storage tank failed causing a release.
9/7/2005 9:50	Cheyenne	Storage Tank	A hose ruptured on a tank due to equipment failure and released slurry oil tank bottoms onto the ground.
8/8/2005 8:00	F.E. Warren Air Force Base	Mobile	The caller stated that a fire truck had a hydraulic system that blew resulting in a release.
8/7/2005 22:00	Cheyenne	Fixed	Caller reported that mercury released from a broken thermometer.
6/19/2005 15:25	Cheyenne	Railroad	Reporting a material release from a tank car due to unknown causes at this time.
5/17/2005 12:20	Cheyenne	Mobile	Jet fuel spilled onto the concrete from a faulty valve on a tanker truck.
4/6/2005 11:15	Cheyenne	Storage Tank	The material released from a pump attached to the storage tank due to a seal failure.
4/6/2005 6:30	Laramie	Fixed	The material released from a portable power generator within a mine due to operator error (punctured the filter while performing maintenance).
3/30/2005 17:15	Cheyenne	Fixed	Caller stated there was a release of materials from a compressor due to an equipment failure.
1/11/2005 16:30	Cheyenne	Fixed	The material released from an ammonia booster pump due to a faulty relief valve.

Source: National Response Center, www.nrc.uscg.mil/

Frequency/Likelihood of Occurrence

Using the methodology described in Section 4.2.1, we can calculate the probability of a hazardous materials incident occurring in the county in any given year. There were 84 events over a six year period (2011-2005). Thus, the probability equation is as follows:

$$84 \times 100 = 100\%$$

Therefore, it is virtually guaranteed that a hazardous materials incident will occur in Laramie County in any year. This corresponds to a rating of **highly likely**.

Potential Magnitude

Overall, impacts from a hazardous materials incident in Laramie County could be **critical**. Cheyenne, Burns, and Pine Bluffs are particularly at risk given their proximity to major transportation routes. Ultimately, the potential magnitude would likely vary depending on the specific nature of an event.

No data is readily available on response and cleanup costs for previous incidents. However, it is estimated that the costs are many tens of thousands of dollars per year.

Vulnerability Assessment

Population

Several major transportation routes cross through the City of Cheyenne, including I-80, I-25, the Union Pacific rail line, and the Burlington Northern Santa Fe rail line. Hazardous materials are transported along these corridors regularly, if not every day. Residential areas are located in the immediate vicinity of the rail-switch yards, potentially presenting a serious public health and safety concern if a hazardous materials incident were to occur there. Both Pine Bluffs and Burns are located in close proximity to I-80 and the Union Pacific rail line. Figure 4.31 and Figure 4.32 depict the population exposure along transportation corridors to hazardous materials in Laramie County and the City of Cheyenne, respectively.

Population vulnerability to a transportation based hazardous materials incident was estimated using GIS. A buffer zone of 1 mile on either side of the major transportation corridors (I-25, I-80, and the railroads) was created. The population within that buffer zone was then estimated by overlaying the buffer on Census block data from HAZUS 2.1. Based on this assessment 56,168 people in Laramie County are exposed to hazardous materials along transportation corridors. HAZUS 2.1 currently uses population data from the 2000 Census, so it is likely that this figure is low. This includes an estimated 44,574 people in the City of Cheyenne within a mile of the corridors. The Towns of Pine Bluffs and Burns fall entirely within the buffer zone. Thus, 2010 Census estimates can be used to determine how many people in the two towns are vulnerable to hazardous materials. 301 people are vulnerable to hazardous materials transportation accidents in Burns, and 1,129 people are vulnerable in Pine Bluffs. Actual vulnerability will vary depending on the accident location, type of materials released, weather conditions, etc.

Figure 4.31. Population along Transportation Corridors in Laramie County

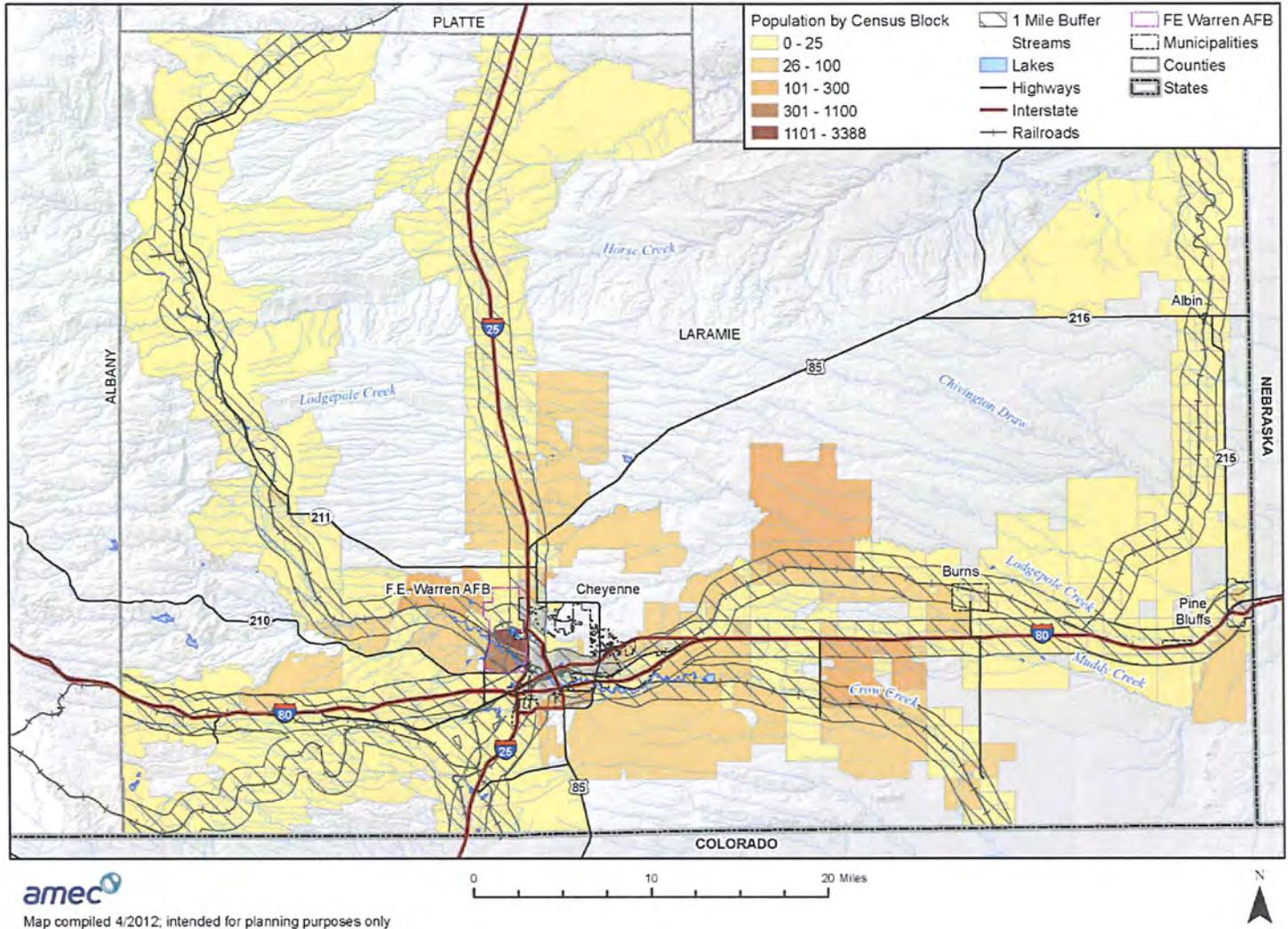
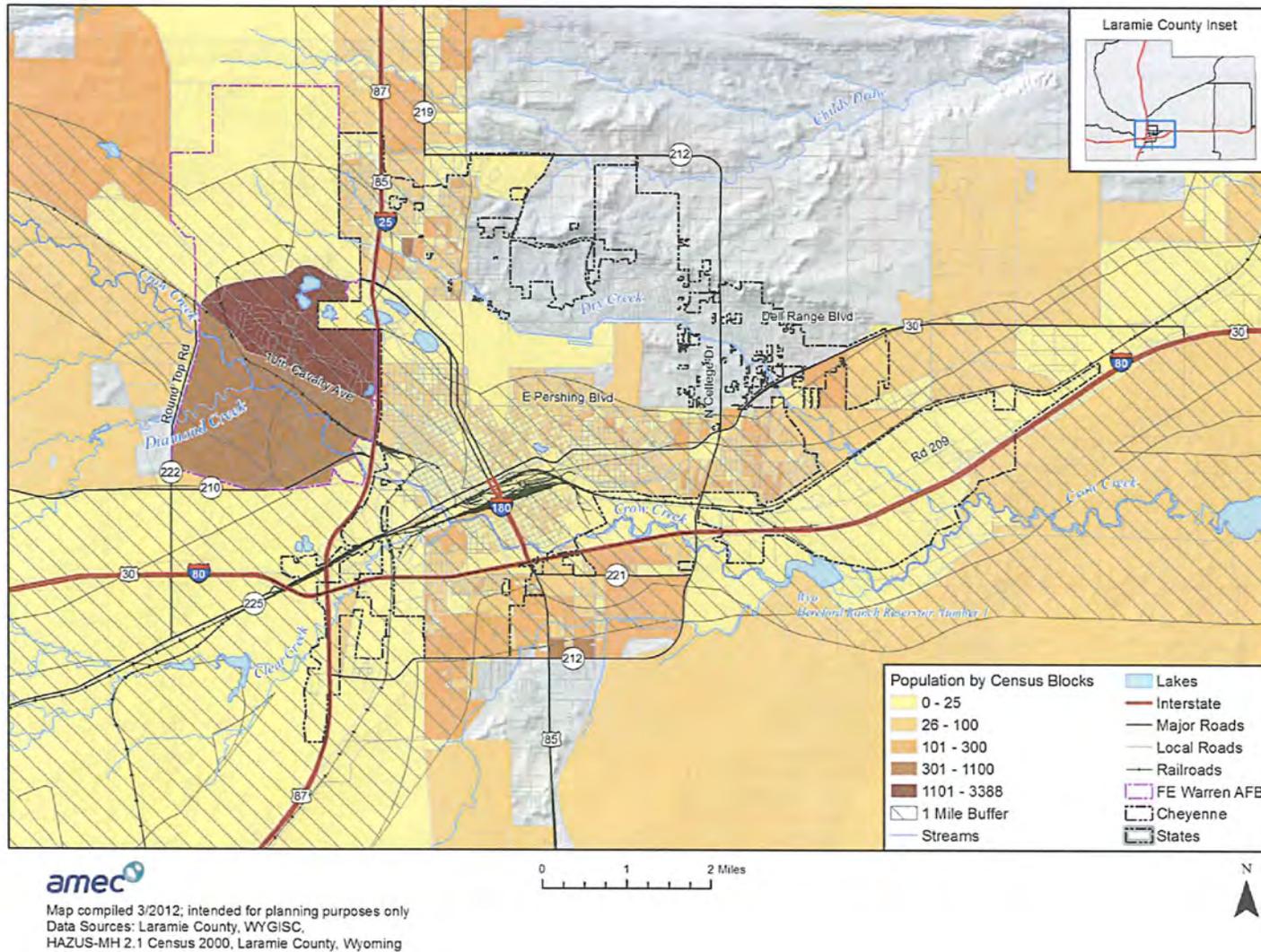


Figure 4.32. Population along Transportation Corridors in the City of Cheyenne



General Property

Any buildings within the buffer zones depicted in Figure 4.31 and Figure 4.32 are potentially exposed to a hazmat event. Materials that are corrosive can degrade structural integrity. Flammable and explosive hazardous materials can create a secondary threat to property and life through fire risk. Residential and business areas in all participating jurisdictions are located in close proximity to major interstates and railroads. In a hazmat event, these structures could be physically damaged or rendered unfit for occupation. If businesses were forced to shut down due to a hazmat spill, the affected jurisdiction's economy would be affected. Hazardous materials events can also compromise water, air, and/or soil quality in the impacted area.

Essential Infrastructure, Facilities, and Other Important Community Assets

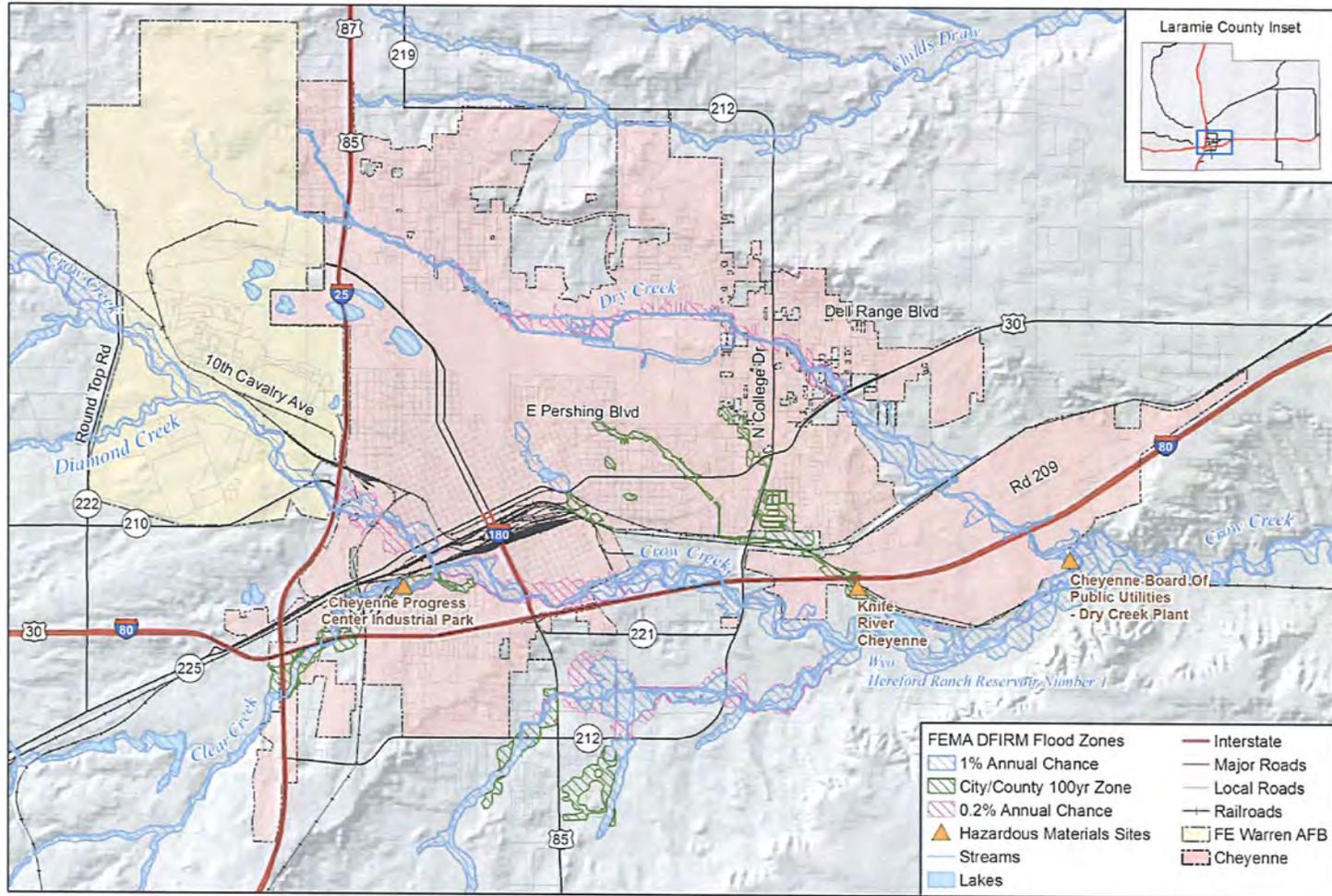
An analysis of critical facilities indicated that approximately 138 (63%) of the county's 220 critical facilities are within the buffer zone. This includes facilities with vulnerable populations such as schools, daycares, and health care facilities. A hazardous materials event could shut down critical facility operations, at least temporarily.

A GIS analysis for hazardous materials fixed facility locations in Laramie County identified four locations that are potentially exposed to flood hazards, creating the possible need for widespread evacuations if such a flood event occurred, or the potential for hazardous materials to be mixed with floodwaters. Table 4.38 summarizes the facilities that are potentially at risk. All hazardous sites are found within the City of Cheyenne, and are located within the 1% annual chance flood zone and are identified in the table. Figure 4.33 depicts the location of these facilities in the City of Cheyenne.

Table 4.38 Hazardous Materials Facilities Located in Flood Hazard Areas

Facility Name	City	Flood Zone
Cheyenne Progress Center Industrial Park-CYNE Progress Center/Nielson Trust	Cheyenne	1%
Cheyenne Board of Public Utilities - Dry Creek Plant	Cheyenne	1%
Knife River Cheyenne	Cheyenne	1%
Maintenance Shop	Cheyenne	1%

Figure 4.33. Hazardous Materials Facilities Located in Flood Hazard Areas



Map compiled 9/2012; intended for planning purposes only
 Data Sources: Laramie County, WYGISC, FEMA DFIRM 1/17/2007,
 Crow Creek LOMR from City of Cheyenne

0 1 2 Miles



Natural, Historic, and Cultural Resources

Endangered species could be impacted and historical/cultural structures could be damaged by a hazmat event. Wetlands could be contaminated and require expensive remediation and restoration efforts.

SUMMARY

Overall, hazardous materials present a **high** significance hazard to Laramie County, Cheyenne, Albin, Burns, and Pine Bluffs.

PROPERTY AFFECTED: High

POPULATION AFFECTED: High

PROBABILITY: Highly Likely

JURISDICTION AFFECTED: Laramie County, City of Cheyenne, Town of Burns, Town of Pine Bluffs

4.2.9 Lightning

Hazard/Problem Description

Lightning is an electrical discharge between positive and negative regions of a thunderstorm. Intracloud lightning is the most common type of discharge. This occurs between oppositely charged centers within the same cloud. Usually it takes place inside the cloud and looks from the outside of the cloud like a diffuse brightening that flickers. However, the flash may exit the boundary of the cloud, and a bright channel can be visible for many miles.

Although not as common, cloud-to-ground lightning is the most damaging and dangerous form of lightning. Most flashes originate near the lower-negative charge center and deliver negative charge to earth. However, a large minority of flashes carry positive charge to earth. These positive flashes often occur during the dissipating stage of a thunderstorm's life. Positive flashes are also more common as a percentage of total ground strikes during the winter months. This type of lightning is particularly dangerous for several reasons. It frequently strikes away from the rain core, either ahead or behind the thunderstorm. It can strike as far as 5 or 10 miles from the storm in areas that most people do not consider to be a threat. Positive lightning also has a longer duration, so fires are more easily ignited. And, when positive lightning strikes, it usually carries a high peak electrical current, potentially resulting in greater damage.

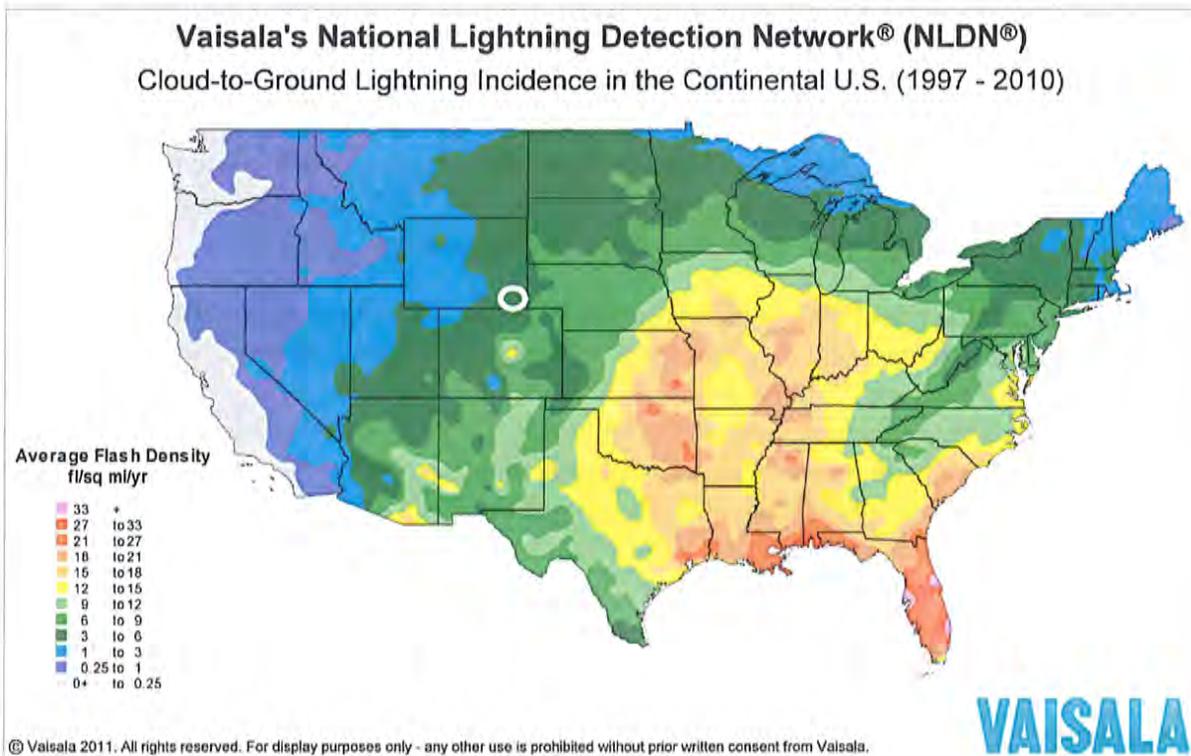
According to the National Lightning Safety Institute, lightning causes more than 26,000 fires in the United States each year. The institute estimates property damage, increased operating costs, production delays, and lost revenue from lightning and secondary effects to be in excess of \$6

billion per year. Impacts can be direct or indirect. People or objects can be directly struck, or damage can occur indirectly when the current passes through or near it.

Geographical Area Affected

The geographic extent for lightning may be examined in two ways. In one regard, 'lightning' is a regional hazard measure by the possible places of occurrence. In the other, 'lightning incidents' refer to single-point occurrences and are measured according to density. Acknowledging that lightning may occur anywhere within the planning area is important but does not provide particularly insightful information. Examining the density of the lightning flashes may yield more useful information, particularly when the potential impacts of the hazard are examined. According to data compiled by the Vaisala Group, Wyoming averaged 304,973 cloud-to-ground lightning strikes per year between 1997 and 2010. The state's strike density was 3.1 strikes per square mile for that time period, the 38th highest strike density in the nation (excluding Alaska and Hawaii). Therefore, although 100% of the planning area is vulnerable to lightning strikes, the density of these single-point occurrences is fairly limited. Based on this information, the geographic extent of this hazard in Laramie County is **limited**. Strike density across the continental U.S. is illustrated in Figure 4.34.

Figure 4.34. Cloud-to-Ground Lightning Flash Density in Continental U.S.: 1997-2010 (Laramie County approximate area circled in white)



Source:

<http://www.vaisala.com/VaisalaImages/Product%20and%20services/NLDN%20CG%20Flash%20Density%20Miles%201997-2010.png>

Past Occurrences

According to the SHELDUS database, ten lightning events in Laramie County caused death, injury, or significant damage between 1960 and 2010. The events are summarized in Table 4.39. SHELDUS had few details on the events, but costs associated with lightning are typically related to fire damages.

Table 4.39 Fatal and Damaging Lightning Events in Laramie County: 1960-2010

Date	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)
6/2/1961	1	0	0	0
6/28/1962	1	0	0	0
7/12/1963	1	1	0	0
6/14/1965	1	0	0	0
6/7/1969	1	0	0	0
7/7/1971	1	0	0	0
11/12/1973	0	0	21,739	0
6/25/1982	0	0	500	0
7/3/1988	0	0	5,000	0
7/10/1988	0	0	5,555	0
TOTALS	6	1	32,794	0

Source: SHELDUS

The 2011 Wyoming Multi-Hazard Mitigation Plan detailed 15 incidents of damaging lightning events in Laramie County from 1947 to 1996. Those events are summarized in Table 4.40.

Table 4.40 Fatal and Damaging Lightning Events in Laramie County: 1947-1996

Date	Location	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)
4/3/1947	Albin	0	1		
6/18/1950	Cheyenne	0	1		
8/9/1956	Horse Creek				
5/29/1957	Cheyenne				
6/2/1961	Cheyenne	1	0		
6/28/1962	Cheyenne	1	0		
7/12/1963	5 miles north of Burns	1	1		
6/14/1965	25 miles west of Cheyenne	1	0		

Date	Location	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)
6/7/1969	Cheyenne	1	0		
8/21/1981	Burns				
6/25/1982	Cheyenne			800	
7/22/1986	Cheyenne	1	0		
7/18/1988	Pine Bluffs				
6/8/1996	Cheyenne				
TOTALS		6	3	800	

Source: 2011 Wyoming Multi-Hazard Mitigation Plan

Frequency/Likelihood of Future Occurrence

It is certain that lightning will occur every year in Laramie County, but not all strikes will be damaging or fatal. To calculate the likelihood that damaging lightning events will occur in the future, divide the number of damaging events (ten) by the available historic record (2010–1960=50), then multiply by 100 to calculate the probability percentage. Regarding lightning, this formula is mathematically expressed as:

$$\frac{10}{50} \times 100 = 100\%$$

This yields a 20% probability that a damaging lightning event will occur in any given year in Laramie County. Therefore, the likelihood of occurrence is **likely**—10-100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less.

Potential Magnitude

Lightning can cause deaths, injuries, and property damage, including damage to buildings, communications systems, power lines, and electrical systems. It also causes forest, brush, and structural fires. Damage from lightning occurs in four ways:

- Electrocutation, severe electrical shock, and burns of humans and animals
- Vaporization of materials in the path of the strike
- Fire caused by the high temperatures associated with lightning
- Power surges that can damage electrical and electronic equipment

When people are struck by lightning, the result is deep burns at the point of contact (usually on the head, neck, and shoulders). Approximately 70 percent of lightning survivors experience residual effects such as vision and hearing loss or neuropsychiatric issues. These effects may develop slowly and only become apparent much later. Death occurs in 20 percent of lightning strike victims.

Lightning strikes cause intense but localized damage. In contrast to other hazards, lightning does not cause widespread disruptions with the community. Structural fires, localized damage to buildings, damage to electronics and electrical appliances, and electrical power and communications outages are typical consequences of a lightning strike. Additionally, indirect fatalities may result via electrocution when a person steps from a vehicle into standing water that was previously “charged” by a live power-line that was knocked loose by a lightning strike.

The indirect social and economic impacts of lightning damage are typically associated with the loss of electrical power. Since society relies heavily on electric power, any disruption in the supply, even for a short time period, can have significant consequences. Wildfires can also be an indirect result of a lightning strike.

Past events in Laramie County indicate that the potential magnitude of lightning events will likely be **limited**—isolated deaths and/or injuries and illnesses may occur; major or long-term property damage that threatens structural stability due to structural damage or fires; and/or interruption of essential facilities and services for 24-72 hours due to structural damage or utility outages.

Vulnerability Assessment

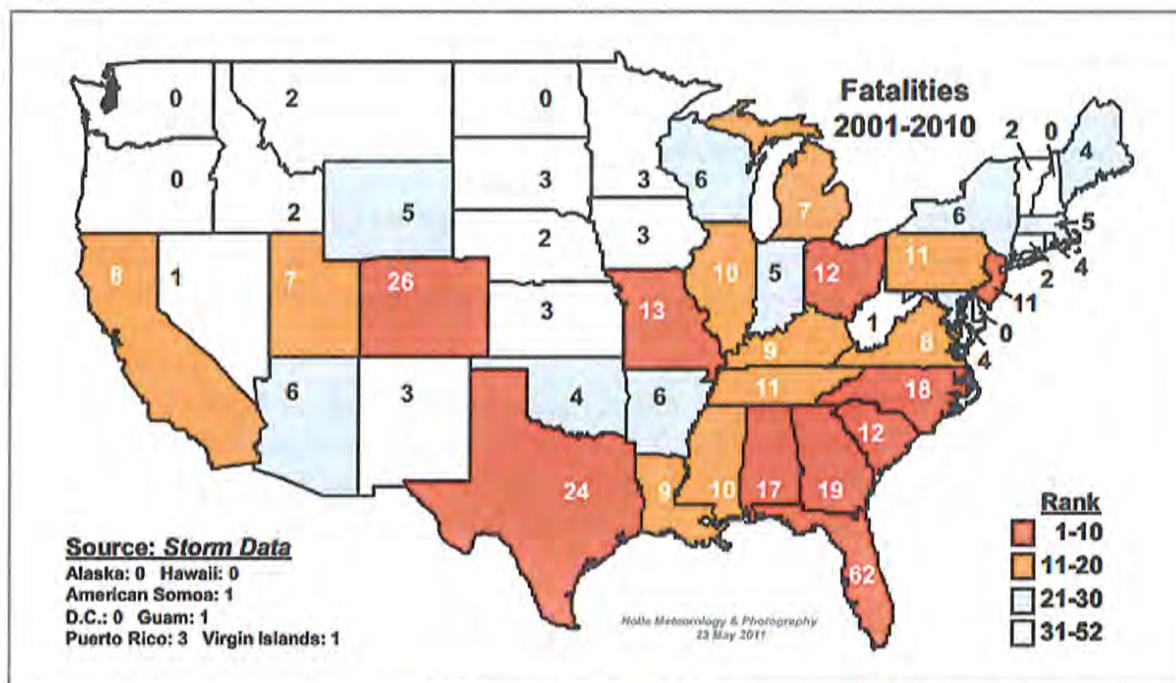
Population

Anyone who is outside during a thunderstorm is at risk of being struck by lightning. Aspects of the population who rely on constant, uninterrupted electrical supplies may have a greater, indirect vulnerability to lightning. As a group, the elderly or disabled, especially those with home health care services relying on rely heavily on an uninterrupted source of electricity. Resident populations in nursing homes, Community Based Residential Facilities, or other special needs housing may also be vulnerable if electrical outages are prolonged. If they do not have a back-up power source, rural residents, and agricultural operations reliant on electricity for heating, cooling, and water supplies are also especially vulnerable to power outages.

According to the Vaisala Group and National Lightning Detection Network, Wyoming ranked 27th among the 50 U.S. states, Puerto Rico, and Washington D.C. for overall lightning deaths between 2001 and 2010. Five people died from lightning events in Wyoming during that time frame. This would suggest that lightning is not a major hazard for Wyoming. However, the state had the highest per capita fatality rate within that same time period at 0.96 deaths per million people. Figure 4.35 illustrates the number of lightning fatalities that occurred in each state between 2001 and 2010.

Nationwide, 85 percent of lightning victims are children and young men ages 10-35 engaged in outdoor recreation or work. People may often find themselves outside and need to be especially watchful of the weather during the summer months when afternoon thunderstorms are more common.

Figure 4.35. Lightning Fatalities by State: 2001-2010



Source: http://www.lightningsafety.noaa.gov/stats/01-10_deaths_by_state.pdf

General Property

According to the event summaries in the 2011 Wyoming Multi-Hazard Mitigation Plan, the majority of reported damages from lightning are fires to private structures, damage to chimneys or steeples, or small grass fires. Property is more vulnerable to lightning than population because of the exposure ratios. Buildings remain exposed. Mitigation techniques such as choice of building materials or landscaping help reduce the vulnerability of these properties, but there is not data available to segment these properties out of the overall vulnerability assessment.

Essential Infrastructure, Facilities, and Other Important Community Assets

Some essential infrastructures and facilities can be impacted by lightning. Emergency responders, hospitals, government services, schools, and other important community assets are not more vulnerable to lightning than the general vulnerabilities established for property and population. Some aspects of infrastructure are constructed of materials and/or located in places that increase their vulnerability to lightning. Sometimes, communications and infrastructure are interrupted by lightning strikes. These events raise the vulnerability of the essential functions by delaying response times, hindering interagency communication efforts, or endangering or damaging communication networks.

Natural, Historic and Cultural Resources

There are no indications that cultural or historic resources are more vulnerable to lightning than as previously accounted for as general structures. Natural resources may be vulnerable to indirect impacts of lightning, such as wild fires caused by lightning strikes. The presence of large areas of water, or of wide, open spaces in natural habitats may increase the danger of lightning strikes to trees, people, or structures, but these vulnerabilities are not directly related to natural resources. Campgrounds are areas where lightning strikes have more dangerous impacts, so populations utilizing the campgrounds may have a higher vulnerability.

Summary

Overall, lightning is a **low** significance hazard in Laramie County, Cheyenne, Albin, Burns, and Pine Bluffs.

PROPERTY AFFECTED: Low

POPULATION AFFECTED: Low

PROBABILITY: Likely

JURISDICTION AFFECTED: County, City of Cheyenne, Town of Albin, Town of Burns, Town of Pine Bluffs

4.2.10 Tornadoes

Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying a thunderstorm. Tornadoes are the most powerful storms that exist. They can have the same pressure differential that fuels 300 mile wide hurricanes across a path less than 300 yards wide. Closely associated with tornadoes are funnel clouds, which are rotating columns of air and condensed water droplets that unlike tornadoes, do not make contact with the ground.

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis, better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado. Table 4.41 shows the wind speeds associated with the original Fujita scale ratings and the damage that could result at various levels of intensity. Table 4.42 shows the wind speeds associated with the Enhanced Fujita Scale ratings. The Enhanced Fujita Scale's damage indicators and degrees of damage can be found online at www.spc.noaa.gov/efscale/ef-scale.html.

Table 4.41 Original Fujita Scale

Fujita (F) Scale	Fujita Scale Wind Estimate (mph)	Typical Damages
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

Source: National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/f-scale.html

Table 4.42 Enhanced Fujita Scale

Enhanced Fujita (EF) Scale	Enhanced Fujita Scale Wind Estimate (mph)
EF-0	65-85
EF-1	86-110
EF-2	111-135
EF-3	136-165
EF-4	166-200
EF-5	Over 200

Source: National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/ef-scale.html

Tornadoes form when cool, dry air sits on top of warm, moist air. In Wyoming, this most often happens in the spring and early summer (i.e., May, June, and July) when cool, dry mountain air rolls east over the warm, moist air of the plains during the late afternoon and early evening hours. However, tornadoes are possible anywhere in the state, at any time of year, and at any point during the day.

Tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, most injuries and deaths result from flying debris. Property damage can include damage to buildings, fallen trees and power lines, broken gas lines, broken sewer and water mains, and the outbreak of fires. Agricultural crops and industries may also be damaged or destroyed. Access roads and streets may be blocked by debris, delaying necessary emergency response. Tornadoes which affect the developed portions of Laramie County are more likely to

cause high dollar damage amounts, even if they are comparatively smaller, than tornadoes which strike in more remote parts of the county.

Geographical Area Affected

Tornado statistics, especially prior to the 1970s, must be viewed as incomplete since many tornadoes must have occurred without being witnessed. Wyoming's open rangelands experience little if any damage from these storms so many go unreported. In the 1990s, the Internet and Doppler radar increased the public's awareness of tornadoes with the potential of more being observed and reported. However, the trend in annual tornadoes has decreased by one third since 1976 and appears to have coincided with a major hemispheric weather pattern shift, despite the increased reporting based on Doppler radar vortex (circulation) signatures (excerpted from the Wyoming Climate Atlas).

Wyoming, lying just west of “tornado alley,” is fortunate to experience less frequent and intense tornadoes than its neighboring states to the east. However, tornadoes remain a significant hazard in the state. Tornadoes are possible anywhere in Wyoming, especially in the plains region where Laramie County is located. The severe weather conditions that spawn tornadoes are regional events which may impact any extent of the county at a given time, and in this regard, the possible geographic extent for tornadoes is **extensive**. However, tornadoes as a stand-alone event are single-point (or limited point) occurrences similar to lightning. While knowing that the entire planning area is vulnerable to a tornado, the realistic assessment of tornado occurrences indicates that these single point events occur in a **negligible** density. An average of the two extremes, which would be **significant**, may yield the most appropriate extent rating.

Past Occurrences

Between 1907 and 2006, Laramie County had the most tornadoes of any county in Wyoming with 82.3 recorded events. The 0.3 is accounted for by the fact that one tornado also passed through Platte and Goshen Counties. These 82.3 events resulted in one death, 41 injuries, and \$127,687,020 (2011 dollars) in combined damage to property and crops. The fact that more tornadoes were reported in Laramie County than anywhere else in the State is unsurprising, given that this is the part of Wyoming that is closest to “tornado alley.” Laramie County also has the highest population in Wyoming, so it is more likely that tornadoes will be seen and reported. Figure 4.36 shows the concentration and F-scale ratings of tornadoes in Wyoming from 1950 to 1995.

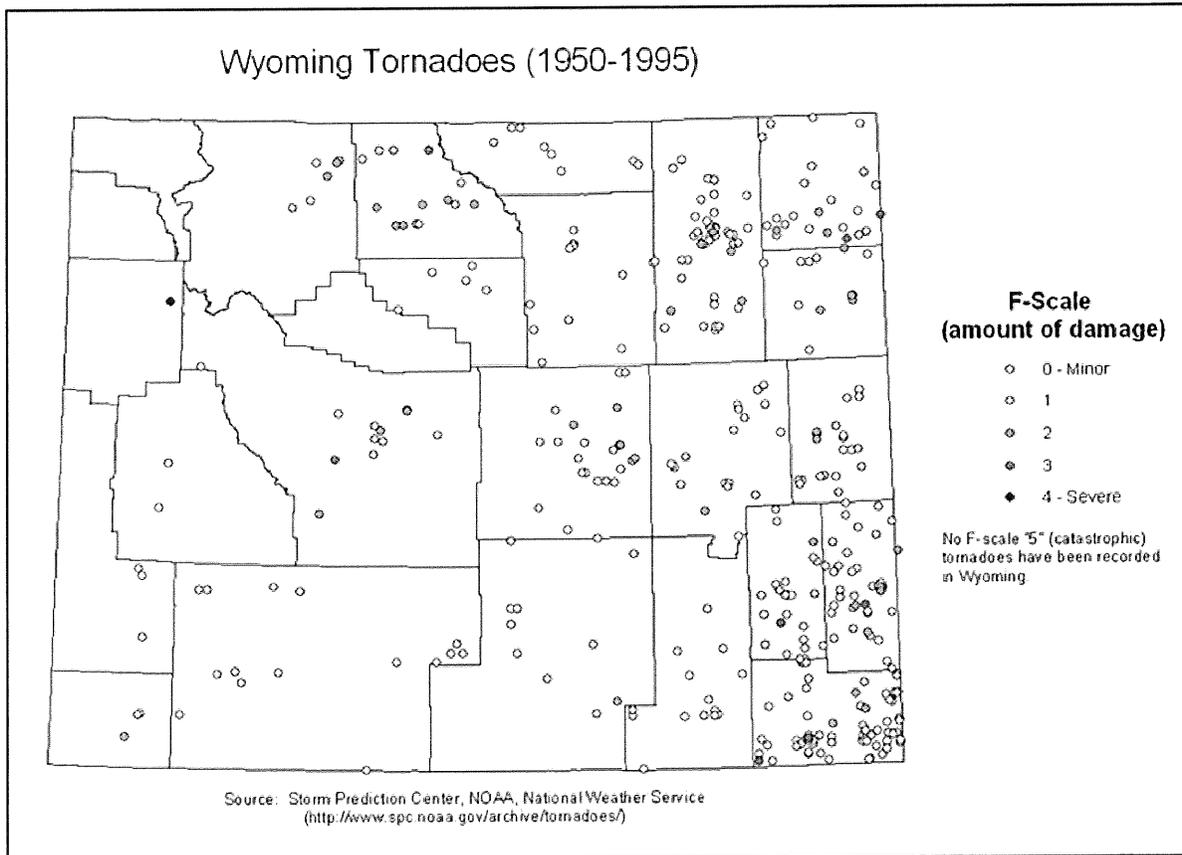
SHELDUS records for Laramie County include 20 tornado events between 1960 and 2010. These events are summarized in Table 4.43. The most devastating tornado in Laramie County occurred on July 16, 1979. This event caused an estimated \$5,000,000 (1979 dollars) in damages. The tornado destroyed or damaged aircraft, National Guard equipment, airport hangars, municipal buildings, and residential structures. The tornado injured 40 people and killed one.

Table 4.43 Laramie County Tornado Events: 1960-2010

Date	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)
4/23/1960	1	0	5,000	0
7/3/1960	2	0	0	0
6/14/1962	0	0	0	500
7/13/1965	0	0	50	0
6/23/1968	0	0	5,000	0
4/19/1971	0	0	500	0
8/28/1974	0	0	5,000	0
5/29/1976	0	0	0	50
5/29/1976	0	0	0	50
6/18/1977	0	0	0	50
6/22/1977	0	0	0	50
7/16/1979	40	1	5,000,000	0
7/16/1979	0	0	50	0
7/30/1979	0	0	500	0
5/15/1991	0	0	50,000	50,000
6/18/1997	0	0	2,000	0
5/30/1999	0	0	2,000	0
8/28/2002	0	0	30,000	0
5/22/2008	0	0	20,000	0
5/18/2010	0	0	50,000	0
TOTALS	43	1	5,170,100	50,700

Source: SHELDUS

Figure 4.36. Wyoming Tornadoes: 1950-1995



Source: 2011 Wyoming Multi-Hazard Mitigation Plan

Several tornadoes impacted the Cheyenne area specifically. On May 29, 1948, a tornado occurred about 10 miles north of Cheyenne. The tornado destroyed some farm buildings, causing about \$10,000 in damage, but there was no loss of life.

On April 19, 1971, a tornado moved from southeast to northwest, did damage to roofs, outbuildings, and toppled one house trailer 3.5 miles east-northeast of the Cheyenne Weather Service Office. Damages were estimated at \$2,750.

On July 16, 1979, the Cheyenne area received an estimated \$125,758,941 worth of damage (2011 USD) from a tornado. The tornado rapidly developed from a moderate thunderstorm and moved through the north part of Cheyenne housing and airport areas. Damage included four C-130 aircraft and National Guard ground equipment (\$12 million estimated), city-owned airport hangars and building damaged (\$10 million estimated), 40 homes destroyed, 100 homes with major damage, 225 homes with lesser damage, and 17 trailer homes destroyed (\$18 million estimated). One destroyed trailer home contained a family, killing a 14-month old boy and severely injuring the mother and a second child.

As a large severe thunderstorm approached Cheyenne on July 30, 1979, two tornadoes and several funnel clouds were seen just west of town. One of the tornadoes did some damage to buildings on a ranch 8 miles west of Cheyenne. The second tornado was near some housing but caused no damage.

On June 18, 1997 a tornado about 4 miles northeast of Cheyenne caused \$2,000 in damages. The anticyclonic tornado touched down near the intersection of Four Mile Road and College Drive, destroying a storage shed.

A tornado on May 30, 1999 briefly touched down on the extreme north edge of Cheyenne, blowing out two windows and causing minor roof damage to a house on Riding Club Road. Damages were estimated at \$2,000.

Frequency/Likelihood of Occurrence

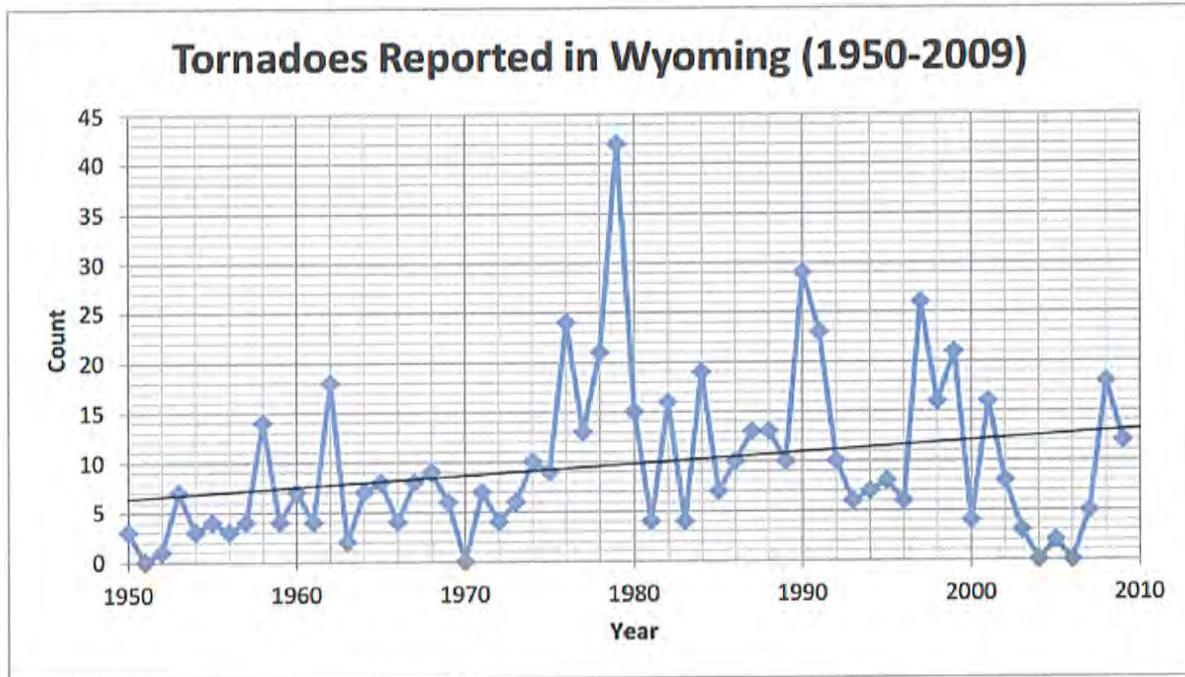
Given 82.3 tornado events occurring between 1907 and 2006, there is an 83% chance that a tornado will occur in Laramie County in any given year. Mathematically, this is expressed as:

$$\frac{82.3}{99} \times 100 = 83\%$$

This corresponds to an occurrence rating of **likely**. However, this statistic may be skewed by the irregularity of tornado reporting in the earlier half of the 20th century. Figure 4.37 shows an upward trend of the number of tornadoes reported each year from 1950 to 2009. This is not necessarily indicative of increased tornado activity; in fact, the trend in annual tornadoes has decreased by one third since 1976 and appears to have coincided with a major hemispheric weather pattern shift. Rather, the graph indicates that tornado *reporting* increased over time likely due to improved weather forecasting techniques, increased public awareness, and higher populations to observe tornado events in the first place. Therefore, early 20th century tornado records may not be entirely accurate, which would skew the likelihood of occurrence rating to be lower.

The likelihood of a tornado occurring also changes according to the time of year. Tornadoes are most likely to occur in Laramie County in June, between 3pm and 4pm due to heating of the day. However, Table 4.43 shows that tornadoes have been recorded in the county as early as April, so people should maintain awareness of tornado watches and warnings throughout the year.

Figure 4.37. Annual Wyoming Tornado County with Long-term Trend Line: 1950-2009



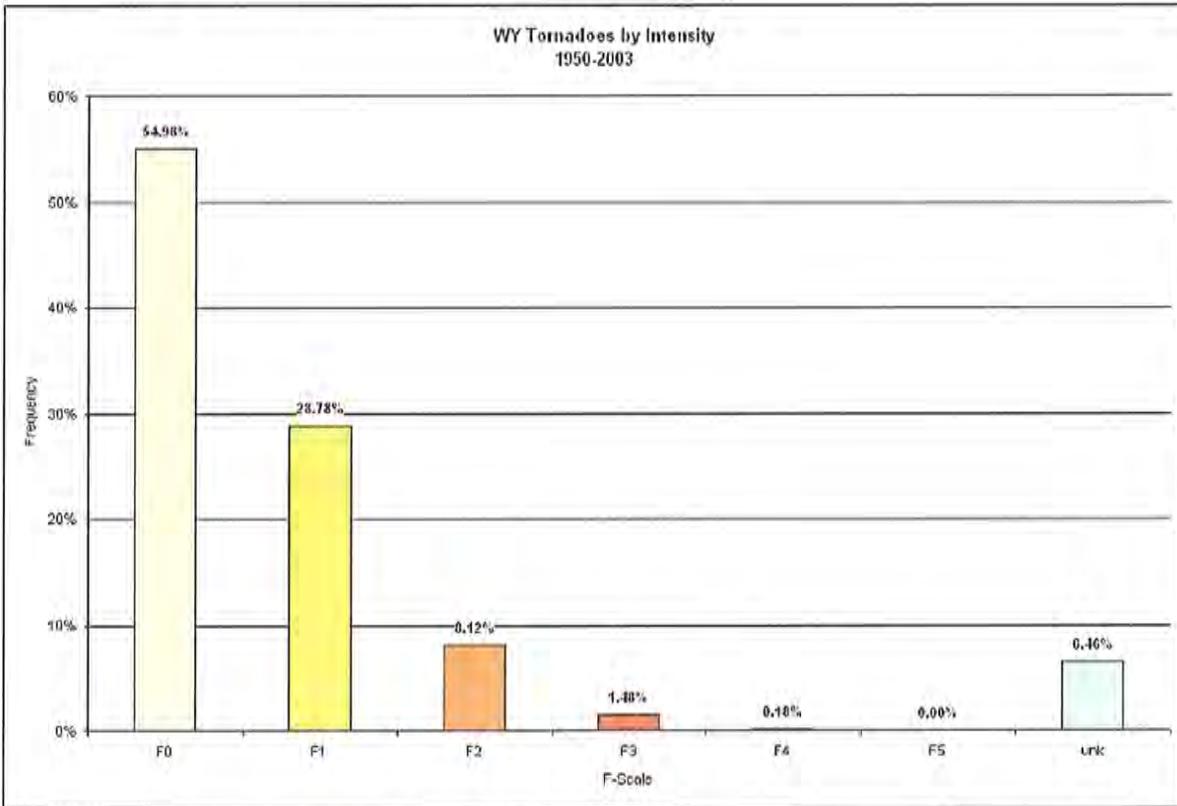
Source: 2011 Wyoming Multi-Hazard Mitigation Plan

Potential Magnitude

The HMPC estimates that the potential magnitude of a tornado could be **catastrophic**. Figure 4.38 breaks Wyoming tornadoes down into percentages according to intensity. F0s account for over half of all tornadoes in the State. F1s account for another 28-29%. This breakdown is also apparent in Figure 4.36, which shows that most tornadoes in Laramie County between 1950 and 1995 were F0s or F1s with a handful of F2s and F3s.

While it is most likely that a tornado in Laramie County would be an F0 or F1, information from the event of record can also be used to calculate the potential magnitude of a tornado event. The event of record for tornadoes in Laramie County is the July 16, 1979 tornado, considered to be the worst in Wyoming's history. This event resulted in an estimated \$5,000,000 (1979 dollars), 40 injuries, and one death. Hundreds of homes and buildings were damaged or destroyed. Given that Laramie County has the highest population in Wyoming, a tornado could have devastating impacts.

Figure 4.38. Wyoming Tornadoes by Intensity: 1950-2003



Source: Wyoming Climate Atlas

Vulnerability Assessment

Population

The entire population of Laramie County is vulnerable to tornadoes. The availability of sheltered locations such as basements, buildings constructed using tornado-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. The population needs to be aware of how to seek shelter during a tornado and avoid behaviors or decisions that place them in greater danger. Extended power outages present another area of vulnerability for Laramie County's population. Vulnerable populations, such as people in nursing homes, are especially at risk from extended power outages if backup power is not available for medical equipment.

General Property

General damages are both direct (what the tornado physically destroys) and indirect, which focuses on additional costs, damages and losses attributed to secondary hazards spawned by the tornado or due to the damages caused by the tornado. Depending on size of the tornado and the

length of time on the ground, a tornado is capable of damaging or destroying almost anything in its path. In terms of property losses caused by any high-wind hazard, the actual damages will depend on the building density and quality of construction in the impacted area. Buildings that are close to large trees or overhead power lines are also at greater risk of suffering more extensive damages. Construction practices can help maximize the resistance of the structures to damage. Based on the event of record, Laramie County could anticipate nearly \$120,000,000 in property damages from a single tornado event; however this magnitude could vary greatly.

Essential Infrastructure, Facilities, and Other Important Community Assets

Tornadoes can wreak havoc on above-ground infrastructure such as power and communication lines. Downed power and communications transmission lines, coupled with disruptions to transportation, create difficulties in reporting and responding to emergencies.

Natural, Historic, and Cultural Resources

Natural, cultural, and historic resources are also exposed to damage from tornadoes. Historic buildings built before modern day building codes and standards may be more vulnerable to damage. Natural resources and endangered species alike could sustain physical damage from tornadoes. Wetlands may require cleanup of debris left by a tornado.

Summary

Overall, tornadoes are a **high** significance hazard for Laramie County, Cheyenne, Albin, Burns, and Pine Bluffs.

PROPERTY AFFECTED: Medium

POPULATION AFFECTED: Medium

PROBABILITY: Likely

JURISDICTION AFFECTED: County, City of Cheyenne, Town of Albin, Town of Burns, Town of Pine Bluffs

4.2.11 Wildland Fires

Hazard/Problem Description

Laramie County, because of its semi-arid climate and rural character, is vulnerable to catastrophic wildland fires, and, of the all fires in Wyoming, over 50% involve wildland areas. As defined by the National Interagency Fire Center (NIFC), a “wildland fire” is any non-structure fire, other than prescribed fire, that occurs in the wildland. Before discussing wildland

fire hazard in Laramie County, some key terms should be identified. The term “wildland/urban interface” or WUI is widely used within the wildland fire management community to describe any area where man-made buildings are constructed close to or within a boundary of natural terrain and fuel, where high potential for wildland fires exists. “Aspect” refers to the direction in which a slope faces. “Fuel” consists of combustible material, including vegetation, such as grass, leaves, ground litter, plants, shrubs, and trees that feed a fire.

As the population and the wildland/urban interface in Wyoming increases, the more significant the risk of wildland fire hazard. The past 100 years of wildland fire suppression has led to heavy vegetation growth and thus has greatly increased the potential fuel-load for a wildfire to burn. As the wildland/urban interface has grown into these densely packed forests, the potential for catastrophic wildland fires has increased as well.

Although different reports, assessments, plans, and programs have been developed by different organizations at all levels of government, interagency coordination has been proven to be more effective, and today Wyoming wildland fires are managed and supported to varying extents through a cooperative efforts by the:

- Bureau of Land Management (BLM) Wyoming Fire Program
- Geospatial Multi-Agency Coordination ([GeoMAC](#)) [Wildland Fire](#) Support Maps
- Wyoming Fire Academy
- Wyoming Wildland Fire Plan Action Team
- National Park Service (NPS) Fire Management Program
- US Fish and Wildlife Service (FWS) Fire Management Branch
- National Interagency Fire Center (NIFC)
- Bureau of Indian Affairs (BIA) Fire and Aviation Management – NIFC
- USDA Forest Service (USFS) Fire and Aviation Management
- Wyoming State Forestry Division

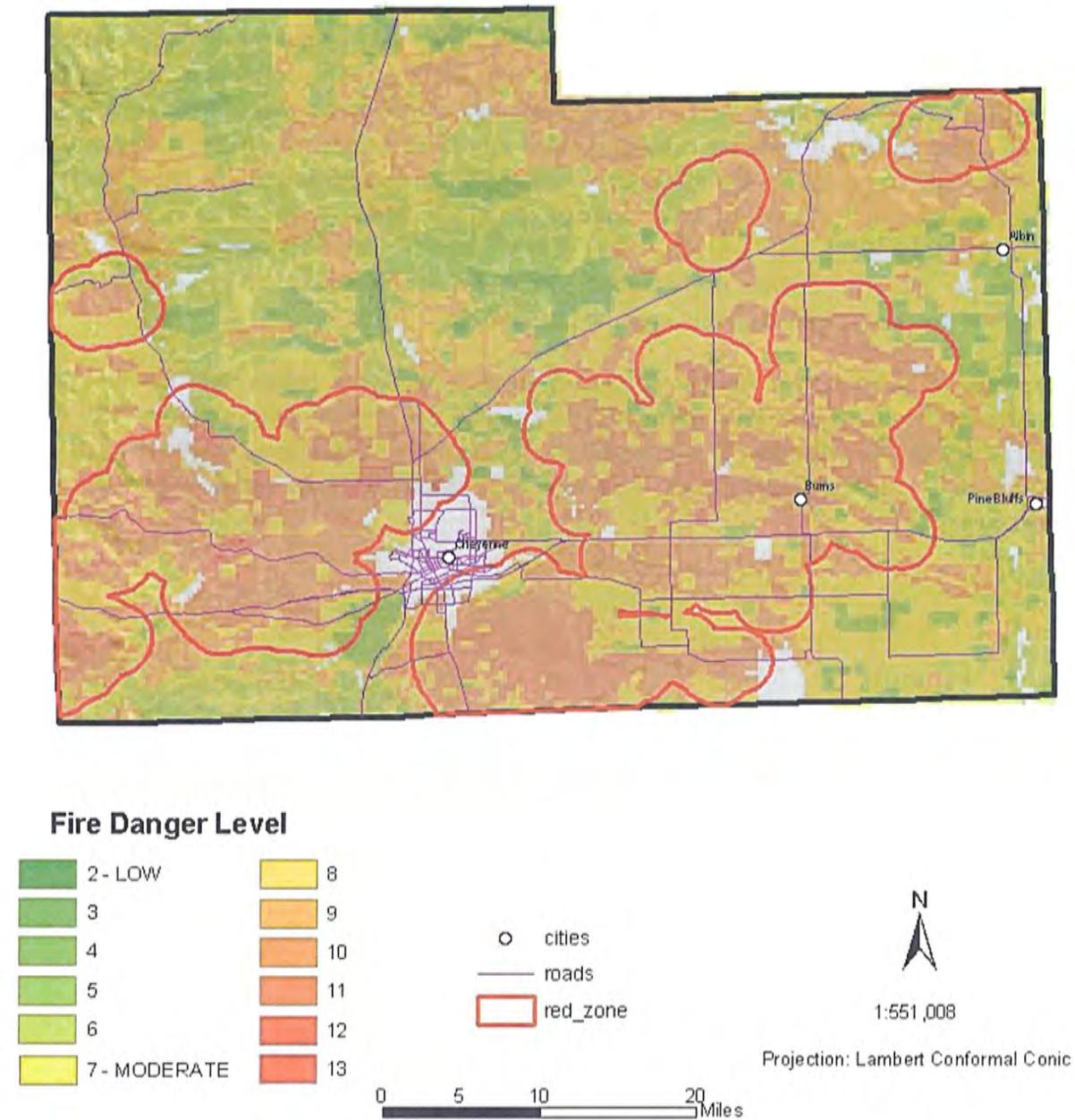
Currently, the principal action plan for the State is the Wyoming Wildland Urban Interface Hazard Assessment produced by a joint venture of the Wyoming State Forestry Division, USFS, BLM, NPS, and other interested parties, with the BLM hosting the data. This is a Geographic Information System (GIS)-based mapping mission building on The Front Range Redzone Project in Colorado—the first fire-hazard mapping program of its kind. The Assessment maps fire hazard incorporating population density against slope, aspect, and fuels. With the mapping analysis evaluating areas of varying wildfire vulnerability, the final output will result in a Risk, Hazard, and Value (RHV) map displaying areas of concern (Redzones) for catastrophic wildland fires (Figure 4.39). The Wyoming Wildland Urban Interface Hazard Assessment builds on the work of earlier hazard methodologies and provides new and updated data to further enhance accuracy and scale.

Geographical Area Affected

The wildland and wildland-urban interface areas in Wyoming are of most concern and are shown in Figure 4.39. A **significant** portion of Laramie County falls within the Redzone. Laramie County covers an area of 2,658 square miles, or 1,718,912 acres. 1,536,064 acres are private lands. Laramie County has a variety of fuels that could contribute to a wildfire anywhere in the county. The primary private land use is divided into three categories; irrigated cropland, dry cropland, and range land. Of these three categories, rangeland has the highest total with 1,114,476 acres, or 64% of the total acreage within Laramie County. The majority of the rangeland is grassland, with a minimal area that is forested. The forested areas are located on government and private lands in the southwestern area of the county. The primary fuel type consists of Ponderosa Pine with mixed shrub components.

The fuels are subject to a variety of ignition sources, including natural and human caused. Historically, fire starts have been contained quickly with minimal loss to property and structures. Several factors can contribute to fire spread, including drought, Red Flag conditions, and high wind events. Due to the arid nature of the climate, wildland fires can and do occur on a year-round basis.

Figure 4.39. Laramie County Wildland Fire Redzones



Data derived from Wyoming State Forestry Division and the U.S. Forest Service

Source: 2011 Wyoming Multi-Hazard Mitigation Plan

Past Occurrences

The wildfire history in Laramie County extends from 1980 to 2010. Data for this section was obtained from the HMPC, the 2005 Laramie County HMP, and the Federal Wildland Fire

Occurrence database housed with the US Geological Survey. Data from the Federal Wildland Fire Occurrence database is compiled from several federal agencies including the BIA, BLM, FWS, NPS, and USFS. The Federal Wildland Fire Occurrence Database recorded only four wildland fires in Laramie County between 1980 and 2010. Two of those fires were false alarms and burned zero acres. The Herrick Creek Cabin #2 fire burned a tenth of an acre on July 4, 1999. The Little Bear fire burned 3,000 acres on September 15. The Federal Wildland Fire Occurrence Data is summarized in Table 4.44.

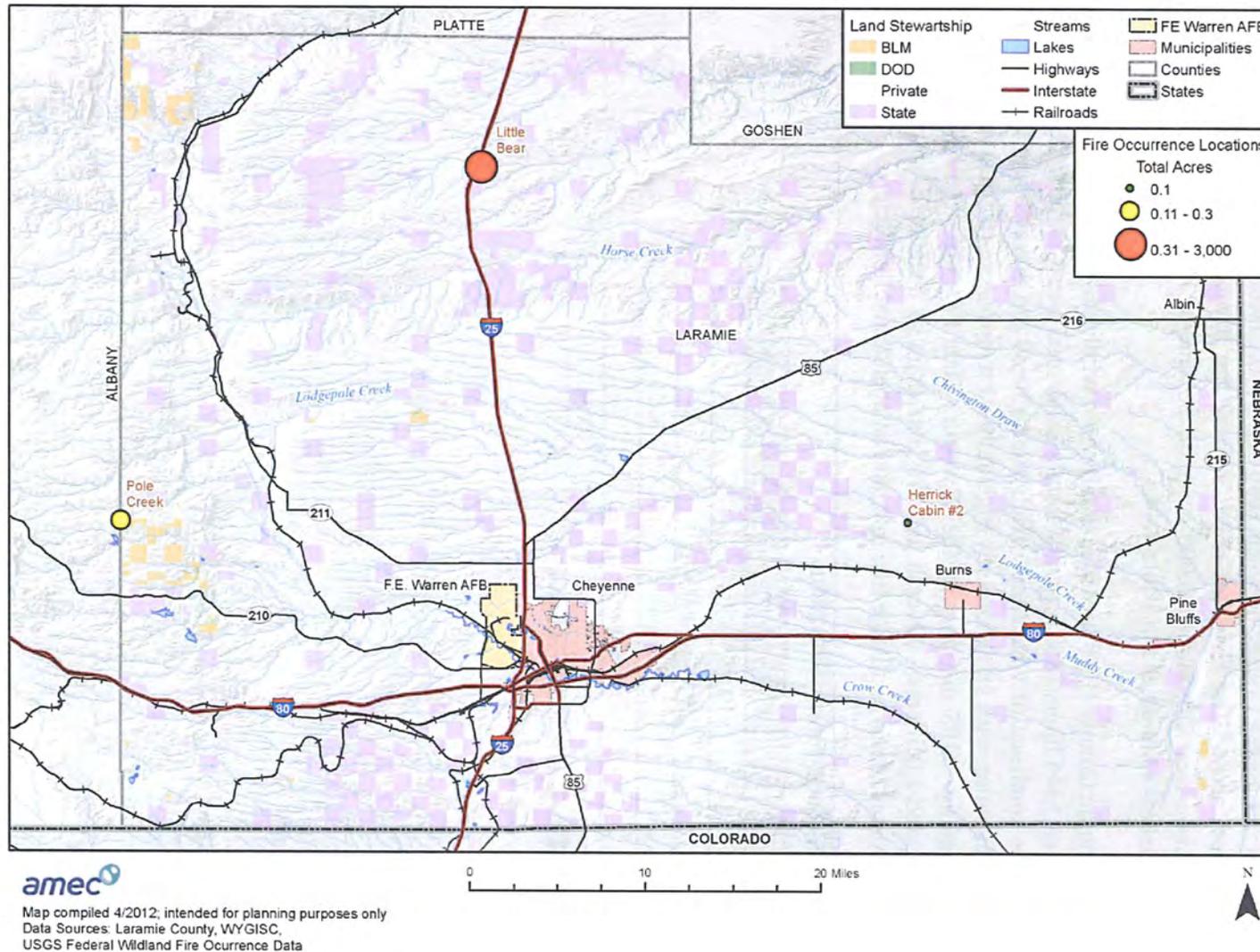
The 2005 Laramie County HMP provided details for a wildland fire that occurred on January 27, 2004. At about 1346 hours MST, a spark from a residential wood-burning stove caused a grass fire five miles southeast of Cheyenne. High wind (50-60 mph) was being experienced at the time. In combination with an abnormally high ambient temperature (60 degrees Fahrenheit), the fire spread rapidly. GPS mapping by the Wyoming State Forestry determined that the actual burn area covered 3,014 acres. Overall, the fire “ran” a linear distance of seven miles. The fire destroyed rangeland grasses, a large tree row, and an abandoned building.

Table 4.44 Wildland Fires 1980-2010

Date	Wildfire Name	Acres Burned
7/16/1985	False Alarm 4	0
7/4/1999	Herrick Cabin #2	0.1
9/17/2005	Little Bear	3,000
6/11/2006	False Alarm 29	0
TOTALS		3,000.1

Source: Federal Wildland Fire Occurrence Database

Figure 4.40. Historic Wildland Fires in Laramie County



Frequency/Likelihood of Occurrence

The HMPC estimates that wildland fires are **highly likely** to occur in Laramie County in any given year. The 2005 Laramie County HMP stated that reporting statistics for wildland fires in the county are incomplete, but fire starts can occur almost daily during fire season. Most events are quickly contained and do not burn a large number of acres. It is important to note that the risk of wildfires occurring may increase during times of drought, especially prolonged droughts such as the statewide Wyoming drought that began between 1999 and 2000 and lasted until 2007.

Potential Magnitude

Local assessments rated wildfire to have a **limited** magnitude, meaning that an event would likely result in some injuries, complete shutdown of critical facilities for more than one week, and more than 10 percent of property being severely damaged. Best available data indicates that the two largest fires in Laramie County between 1980 and 2010 burned roughly 3,000 acres. No damage assessments for these events were available. It is important to note that the magnitude of a wildfire can be intensified by drought. Development and population growth in the WUI can also exacerbate the potential magnitude of a wildland fire.

The magnitude of a wildland fire is estimated to be **critical** in the Town of Pine Bluffs and **limited** in the Town of Burns.

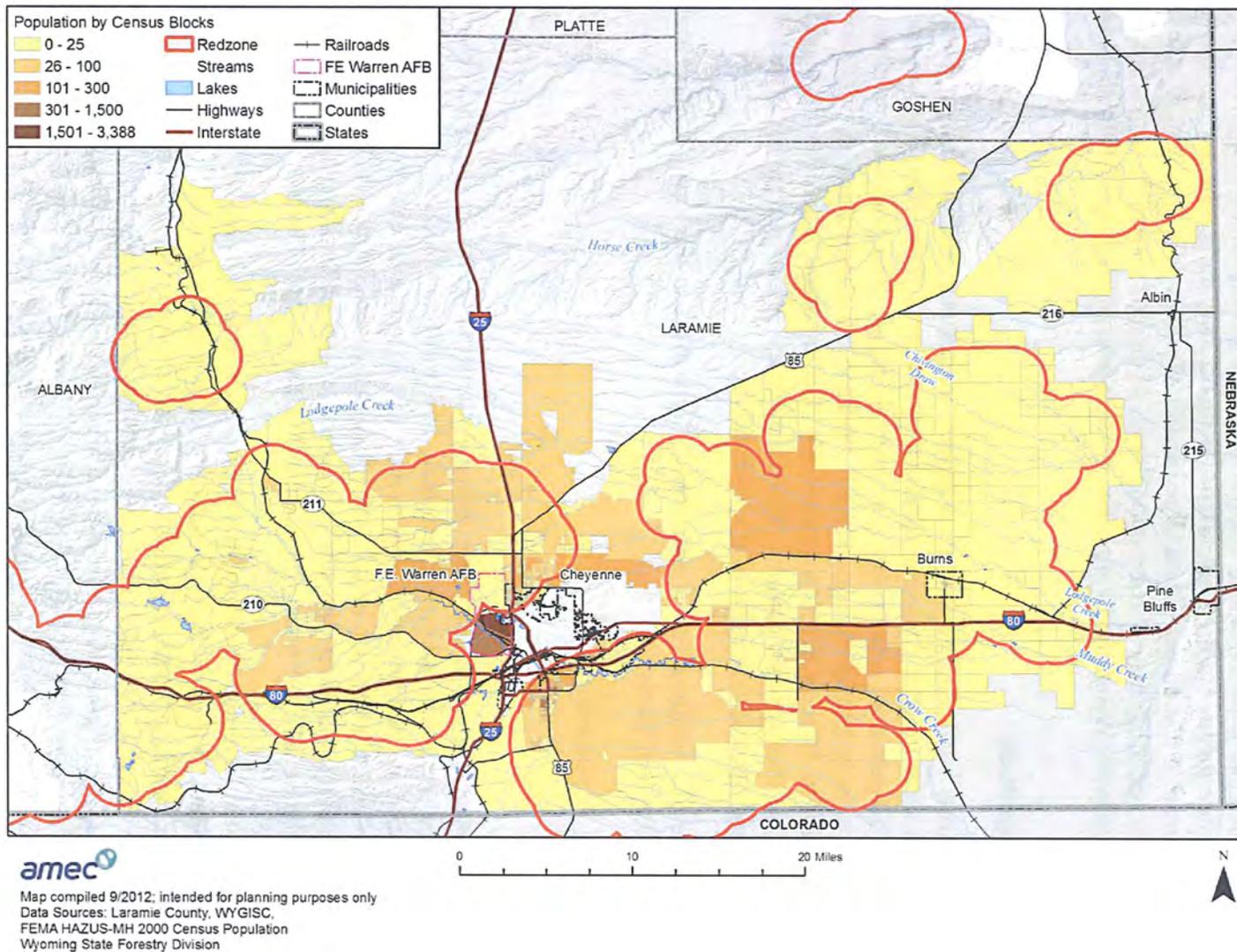
Vulnerability Assessment

Population

The most exposed population are those living in the wildland-urban interface (WUI) zones, where residential properties are directly intruding into traditional wildland areas. The exposure of the population in these zones increases with the exposure of the corresponding general property, examined in the section below. Other exposed groups include children, the elderly, or those with breathing conditions who may be exposed to high levels of smoke. According to the GIS analysis, there are 32,498 people living in the WUI in Laramie County.

The HMPC noted increased development and population growth in the WUI in the western part of Laramie County. Mountain Bark Beetles have killed a high percentage of the trees, possibly increasing the likelihood that a wildland fire could occur. Therefore, the population's vulnerability will increase as more people and structures are located in higher-risk areas. For the past two years, efforts have been made to increase awareness and completion of Defensible Space Plans to mitigate wildland fire vulnerability. This program is still relatively new and will need to be accelerated. Figure 4.41 depicts the population exposure within the Redzones.

Figure 4.41. Population by Census Block within Redzones in Laramie County



General Property

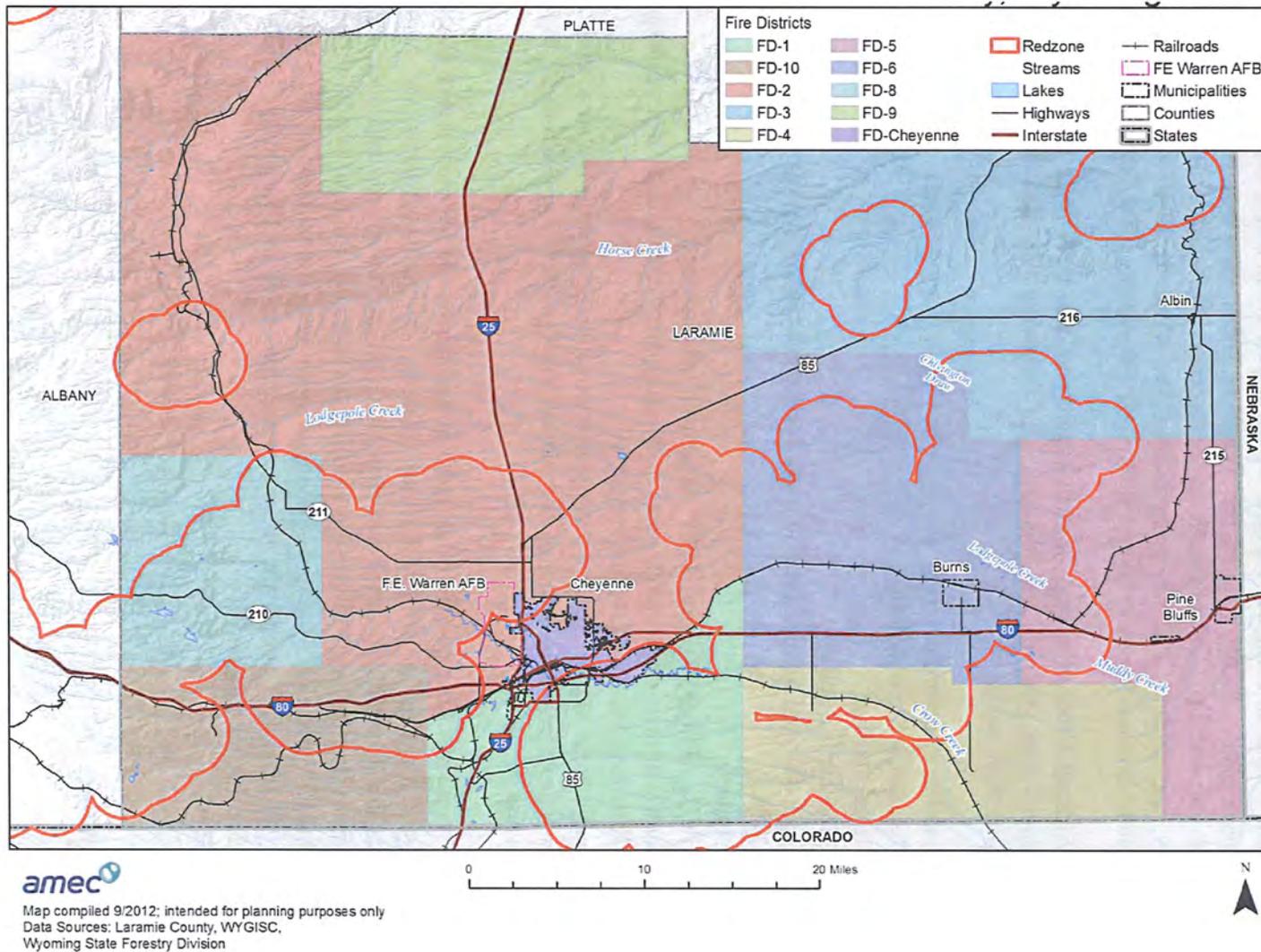
GIS was used to assess the vulnerability of general property to wildland fires in Laramie County. GIS is a tool that is used to compare, capture, input, output, store, manipulate, analyze, model, and display spatial data. In the case of the Wildland Urban Interface Hazard Assessment, wildfire hazard vulnerability is determined by comparing values such as slope, vegetation, housing density, and aspect. The following is from the *Wyoming Wildland Urban Interface Hazard Assessment Methodology*—a report written by the Wyoming State Forestry Division:

“The Wildland Urban Interface Hazard Assessment uses three main layers to determine fire danger—Risk, Hazard, and Values. The following lists include the data used to create each of the three layers.

- 1) Risk – Probability of Ignition
 - a. Lightning Strike density
 - b. Road density
 - c. Historic fire density
- 2) Hazard – Vegetative and topological features affecting intensity and rate of spread
 - a. Slope
 - b. Aspect
 - c. Fuels – Interpreted from GAP Vegetation information.
- 3) Values – Natural or man-made components of the ecosystem on which a value can be placed
 - a. Housing Density – Life and property
- 4) Non-flammable areas Mask – a mask was created to aid in the analysis for areas that will not carry fire such as water and rock areas. These areas show in the final assessment as a zero value for hazard.”

The statewide Wildland Urban Interface Hazard Assessment and its resultant outputs serve two primary purposes: assisting in prioritizing and planning mitigation projects and creating a communications tool to which agencies can relate to common information and data. With the mapping analysis evaluating areas of varying wildfire vulnerability, the final output will result in a Risk, Hazard, and Value (RHV) map displaying areas of concern (Redzones) for catastrophic wildland fires. Figure 4.42 shows the extent of the Redzones in the county in relation to municipal and fire district boundaries.

Figure 4.42. Laramie County Wildland Fire Redzones and Fire District Boundaries

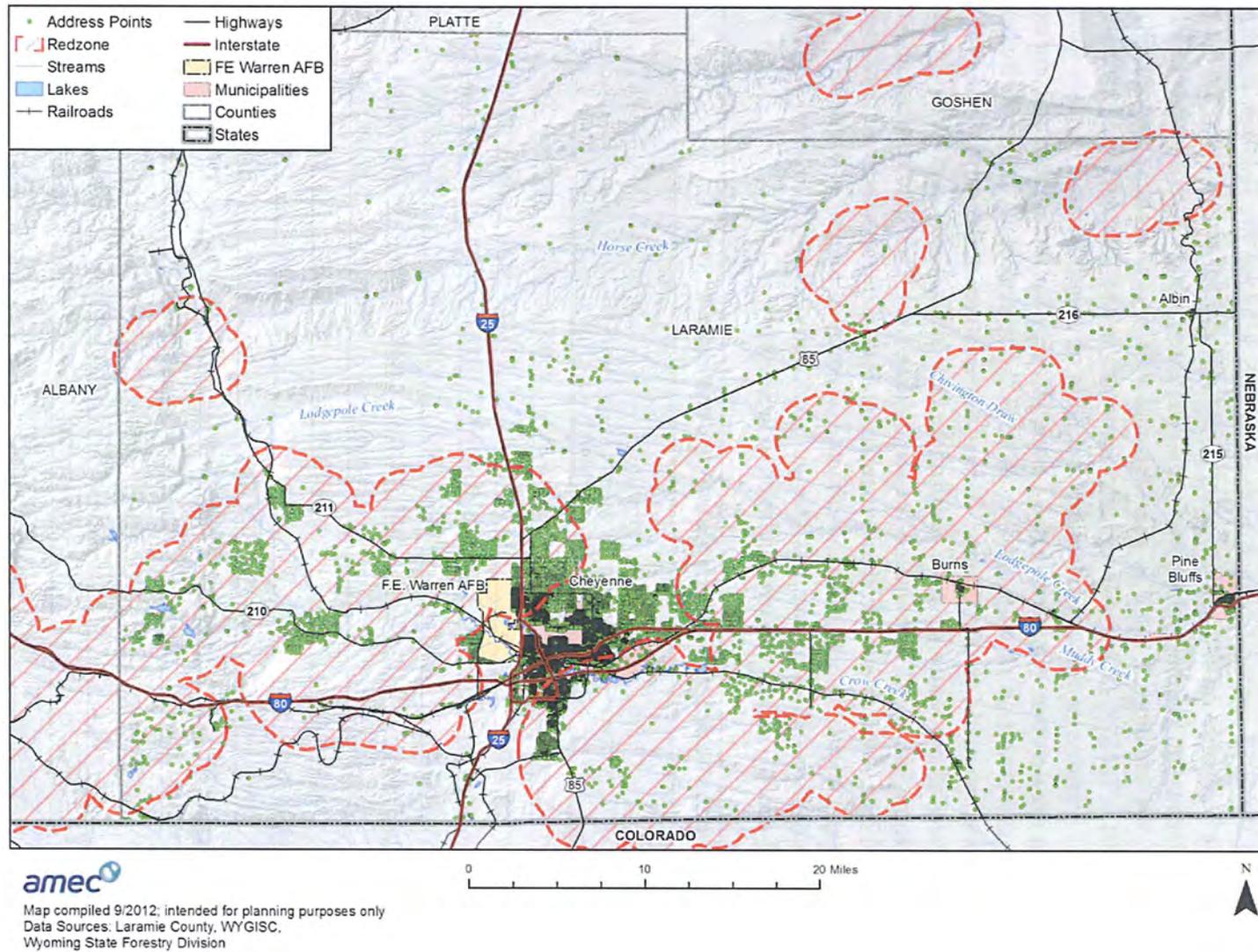


Another method of estimating vulnerability is to determine the value of structures that are located within Redzones, or wildland fire building exposure values. Wildland fire building exposure value is the value of buildings that can be potentially damaged by wildland fire in an area. During the 2012 update a refined analysis of GIS wildland fire risk was performed by overlaying the Redzones on the address point layer and assessor parcel layer for the county, which is attributed with building valuations from the assessors' data. The GIS analysis identified a total of 12,504 buildings located in the Redzone with a total building exposure value of \$3,714,153,001. Table 4.45 lists the property exposure in the Redzones by jurisdiction and building type. Portions of two municipalities and areas of unincorporated Laramie County are located within the Redzone. Unincorporated Laramie County has the highest structure exposure out of all structures at risk to wildland fire; 68% of the structures in the entire Redzone are located in unincorporated Laramie County. 31% of all structures at risk to wildland fire (i.e. the structures located in the Redzone) are located in the City of Cheyenne. All of the structures in the Town of Burns are at risk to wildland fire, accounting for 1.3% of the structure exposure in the entire Redzone. Wildfires often result in complete loss of the structure and contents, so the values in Table 4.45 can be considered an estimate of potential losses. It is unlikely, however, that a wildland fire would devastate this amount of property entirely. Figure 4.43 depicts the WUI building counts (address points) in relation to the Redzone.

Table 4.45 Redzone Wildland Fire Exposure by Jurisdiction

Jurisdiction	Occupancy Type	Building Count	Building Improved Market Value	Contents Value	Total Value
City of Cheyenne	Commercial	96	\$168,295,513	\$168,295,513	\$336,591,026
	Industrial	9	\$16,570,512	\$24,855,768	\$41,426,280
	Multi-Use	71	\$31,894,159	\$31,894,159	\$63,788,318
	Residential	3,728	\$649,940,051	\$324,970,026	\$974,910,077
	Total	3,904	\$866,700,235	\$550,015,466	\$1,416,715,701
Town of Burns	Agricultural	6	\$760,228	\$760,228	\$1,520,456
	Commercial	14	\$988,984	\$988,984	\$1,977,968
	Multi-Use	3	\$211,504	\$211,504	\$423,008
	Residential	134	\$10,129,153	\$5,064,577	\$15,193,730
	Total	157	\$12,089,869	\$7,025,293	\$19,115,162
Unincorporated	Agricultural	507	\$50,619,965	\$50,619,965	\$101,239,930
	Commercial	2,414	\$113,699,830	\$113,699,830	\$227,399,660
	Industrial	47	\$211,277,096	\$316,915,644	\$528,192,740
	Multi-Use	61	\$5,172,826	\$5,172,826	\$10,345,652
	Residential	5,414	\$940,762,771	\$470,381,386	\$1,411,144,157
	Total	8,443	\$1,321,532,488	\$956,789,651	\$2,278,322,139
Total County		12,504	\$2,200,322,592	\$1,513,830,409	\$3,714,153,001

Figure 4.43. Laramie County Wildland Urban Interface with Address Points



Essential Infrastructure, Facilities, and Other Important Community Assets

Through a GIS overlay analysis 61 critical facilities have been identified in Laramie County's Redzone. These facilities are listed in Table 4.46. The facilities are organized by aggregate and then by classification. It is important to note that the number of essential facilities at risk to wildland fire could be higher given the shortcomings of the Redzone map. Neither Pine Bluffs nor Albin are shown as being in the Redzone, though they likely should be. Wildland fire is a comparatively low significance hazard for Albin, but it is a high significance hazard for Pine Bluffs. Pine Bluffs may have critical facilities that are vulnerable to wildland fire not captured here.

Wildland fire potentially threatens the property and functions of these facilities. However, the functions of these 61 critical facilities create additional vulnerabilities. 25 of the buildings in Table 4.46 are at-risk population facilities. Evacuation plans should be considered for these structures. The people who live or work in these buildings may need additional assistance evacuating in the event of a wildland fire. The childcare centers and schools may need additional assistance with evacuation given their higher level of social vulnerability. Table 4.46 also includes 24 buildings with emergency management/first responder functions. These are essential services facilities. Appropriate mitigation projects will help ensure that the critical services provided by these facilities are not interrupted during a wildland fire. The 12 hazmat facilities could be targets for mitigation too, as wildland fire and hazardous materials could be an especially dangerous combination.

Table 4.46 Aggregated Critical Facilities Located in the Redzone

Aggregate	Classification	Total
At Risk Population Facilities	Childcare*	3
	Schools	21
	Schools - Bus Depot	1
	Total	25
Essential Services Facilities	Fire Stations	15
	Government Buildings	6
	Healthcare Facilities	1
	Law Enforcement	2
	Total	24
Hazmat Facilities	Hazardous Materials Facilities	12
	Total	12
Grand Total		61

*Does not include in-home childcare.

Natural, Historic and Cultural Resources

Natural resources and natural areas may actually benefit from wildland fire, as at some level they must also be exposed to wildland fire for a healthy ecological development of the area. Historic and cultural resources exhibit a vulnerability rating similar to those in general property, where vulnerability ratings increase the further into the WUI the property is, and the less mitigated the landscaping surrounding the property is. In addition, older buildings may be exempt from internal fire mitigation such as sprinklers and fire suppression technology, which may increase the vulnerability of the resource. Wildland fires can threaten wetlands, particularly during droughts when the wetlands have been subjected to drying. Endangered fauna and flora can be impacted by fires.

GIS analysis revealed that ten historic structures are located in the Redzone. The ten structures are listed in Table 4.47. Incidentally, these structures are also located in flood zones. Refer to Appendix F for additional details on critical facilities.

Table 4.47 Laramie County Historic Facilities Located in the Redzone

Facility Name	Type	Flood Zone	Redzone
Horse Creek Station	Community/Stop	Yes	Yes
Arp Ranch	Ranch	Yes	Yes
Cole Ranch	Ranch	Yes	Yes
McGee Ranch	Ranch	Yes	Yes
Corlett	Community/Stop	Yes	Yes
School	School	Yes	Yes
School	School	Yes	Yes
School	School	Yes	Yes
School	School	Yes	Yes
School	School	Yes	Yes

Summary

Overall, wildland fire is a **high** hazard to Laramie County and Pine Bluffs. It is a **medium** significance hazard in Burns, and a **low** significance hazard in Cheyenne and Albin.

PROPERTY AFFECTED: High

POPULATION AFFECTED: High

PROBABILITY: Highly Likely

JURISDICTION AFFECTED: County, City of Cheyenne, Town of Pine Bluffs, Town of Burns, Town of Albin

4.2.12 Windstorms

For planning purposes, windstorms, thunderstorm winds, and other high wind events are combined into the single “Windstorms” profile. Although the hazard rankings among these events vary, the hazards that they create and the mitigation actions for addressing those hazards are similar.

Hazard/Problem Description

Thunderstorm Winds

While many people immediately associate wind damage with tornadoes, straight-line winds associated with severe thunderstorms cause extensive damage as well. These winds can become hurricane-force in the worst cases. Table 4.48 lists relative wind speeds and anticipated effects. Additionally, Wyoming experiences another kind of wind damage: non-thunderstorm, widespread “high wind” behind cold-frontal passages in the wake of strong synoptic-scale low pressure systems.

Severe thunderstorms develop powerful updrafts and downdrafts. An updraft of warm, moist air helps to fuel a towering cumulonimbus cloud reaching tens of thousands of feet into the atmosphere. A downdraft of relatively cool, dense air develops as precipitation begins to fall through the cloud. Winds in the downdraft can reach in excess of 87 knots (kts) or 100 miles per hour (mph). When the downdraft reaches the ground it spreads out forming a gust front: the strong, often refreshing wind that kicks up just before the storm hits. As the thunderstorm moves through the area, the full force of the downdraft in a severe thunderstorm can be felt as horizontal, straight-line winds with speeds well over 44 kts (50 mph). Basically, severe thunderstorms in Wyoming can produce wind gusts to 50 to 91 kts (58 to 105 mph) per National Weather Service and NCDC data.

Straight-line winds are currents of air in which the ground-relative motion does not have any significant curvature. They are used in the context of surface winds that inflict damage; to be distinguished from winds in tornadoes, which have significant curvature.³ Straight-line winds are often responsible for most of the damage associated with a severe thunderstorm. Damaging straight-line winds occur over a range of scales. At one extreme, a severe single-cell thunderstorm may cause localized damage from a microburst, a severe downdraft extending not more than about two miles across. In contrast, a powerful thunderstorm complex that develops as a squall line can produce damaging winds that carve a path as much as 100 miles wide and 500 miles long. Severe thunderstorm wind events can inflict considerable damage on trees, power-lines, and other wooden structures.

³ American Meteorological Society, *Glossary of Meteorology*, 2nd Edition. Available online at <http://amsglossary.allenpress.com/glossary> last accessed February 11, 2009.

Windstorms

The non-thunderstorm, widespread “high wind” events usually occur during the cooler part of the year, from October through April. During this time of the year, the atmospheric pressure differences between high pressures and low pressures are maximized. This results in tighter pressure gradients which generates stronger surface winds. These non-thunderstorm “high wind” events usually have wind gusts to 50 to 87 knots (58 to 100 mph) that can persist for 6 to 18 hours over large areas. Non-thunderstorm winds account for most high wind events in Laramie County.

Table 4.48 Wind Speeds and Effects

Wind Speed (kts)	Wind Speed (mph)	Wind Effects
22-27	25-31	Large branches in motion.
28-33	32-38	Whole trees in motion, inconvenience in walking against the wind.
34-47	39-54	Twigs and small branches break off trees, difficulty in walking against the wind, high profile vehicles such as trucks and motor homes may be difficult to control.
48-64	55-74	Potential damage to antenna structures, wind may push over shallow rooted trees, especially if the soil is saturated.
65-83	75-95	Potential for minor structural damage, particularly to manufactured homes, power lines, trees, and signs may be blown down.
84-96	96-110	Moderate structural damage to walls, roofs, and windows, trees blown down, and manufactured homes may be destroyed.
97-113	111-130	Extensive damage to walls, roofs, and windows, trees blown down, moving vehicles pushed off roads.
114-135	131-155	Extreme damage to structures and roofs, trees uprooted or snapped.
Greater than 135	Greater than 155	Catastrophic damage, structures destroyed.

Source: National Weather Service Spotters Guidance

The Beaufort Wind Scale, summarized in Table 4.49, is also used to measure the severity of high winds. Hurricane force winds are defined as a speed equal to or greater than 64 knots (74 mph) or Beaufort Number 12 (Force 12). Hurricane-force winds are not exclusive to hurricanes; they occur quite often in strong non-tropical storms such as the northeaster, or even in severe thunderstorms.

Table 4.49 Beaufort Wind Scale

Force	Wind Speed (kts)	WMO Classification	Appearance of Wind Effects (on Land)
0	Less than 1	Calm	Calm, smoke rises vertically
1	1-3	Light Air	Smoke drift indicated wind direction, still wind vanes
2	4-6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended

4	11-16	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Twigs breaking off trees, generally impedes progress
9	41-47	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56-63	Violent Storm	
12	64+	Hurricane	

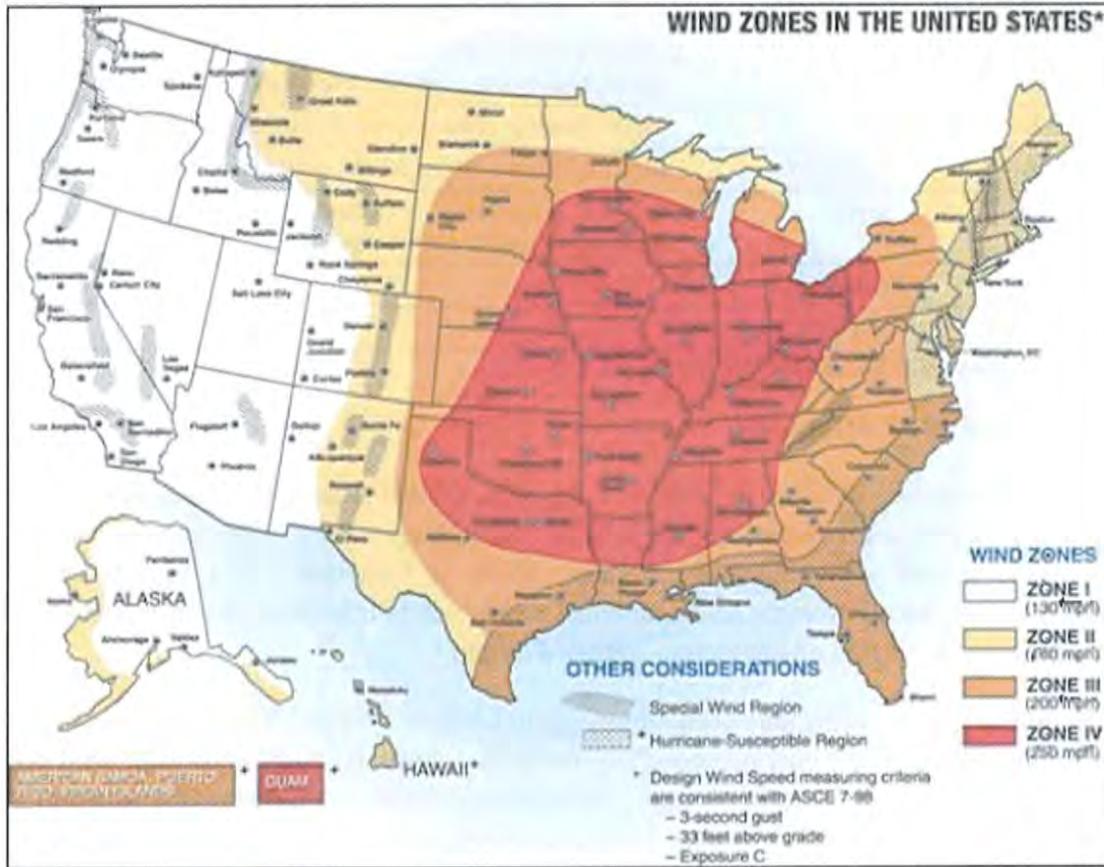
Source: <http://www.spc.noaa.gov/faq/tornado/beaufort.html>

Geographical Area Affected

FEMA recognizes four wind zones in the U.S., as depicted in Figure 4.44. Laramie County falls into Zone II, where wind speeds can reach up to 180 miles per hour. Cheyenne is located just north of the special wind region for Chinook winds in Colorado. The gap in the Rocky Mountains in southern Wyoming tends to funnel strong winds from west to east across the state. Laramie County is located on the eastern edge of this gap.

Damaging windstorm events may occur anywhere in Laramie County. Therefore, the geographic extent rating of the hazard may be considered uniform. However, when damaging wind occurs, it may or may not affect the entire County. Damage associated with a severe thunderstorm tends to be a geographically isolated event, affecting only small areas of several square miles at any one time. On the other hand, widespread, non-thunderstorm high winds can affect much of the County. But since any area of the county can experience damaging windstorms, the geographic extent rating for windstorms and thunderstorm winds is **extensive**.

Figure 4.44. Wind Zones in the United States



Source: FEMA

Past Occurrences

SHELDUS recorded 64 high wind events in Laramie County between 1960 and 2010. These events are summarized in Table 4.50. NCDC reported 111 thunderstorm wind events between 1955 and 2011. Few details were recorded prior to 1993. Table 4.51 includes 66 event narratives that were available from NCDC and NWS. The narratives typically described similar damages including wind gusts over 50pmh, damaged roofs, toppled trees, broken branches, and blown-out windows. Many of the high wind events in Table 4.51 included hail, which could have caused some of the damages described.

Table 4.50 High Wind Events in Laramie County (SHELDUS): 1960-2010

Date	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)
4/23/1961	0.63	0	625	6,250
4/12/1964	0	0	2,173	0

Date	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)
4/27/1964	0	0	2,173	0
12/14/1964	0.09	0	2,173	0
12/21/1964	0.04	0	2,173	0
3/4/1966	0	0	5,555	0
1/11/1972	0	0	21,739	0
1/17/1972	0	0	2,173	0
3/6/1972	0	0	21,739	0
6/18/1973	0	0	2,173	0
1/15/1974	0.06	0	3,125	0
1/30/1974	0.04	0	2,083	0
3/2/1974	0.11	0	5,555	0
3/5/1974	0	0	4,545	0
1/18/1975	0	0	2,173	0
1/18/1975	0	0	2,173	0
9/6/1975	0	0	50,000	0
2/18/1976	0	0	50,000	0
11/28/1978	0	0	217	0
12/22/1978	0	0	50,000	0
12/4/1979	0	0	21,739	0
3/12/1982	0	0	50	0
4/2/1982	0	0	5,000	0
4/14/1982	0	0	500	0
1/5/1983	0	0	625	0
4/1/1983	0	0	1,666	0
12/6/1983	0	0	6	0
11/2/1984	0	0	1,250,000	0
12/23/1984	0	0	833	0
5/4/1986	0	0	2,173	0
1/25/1988	0	0	5,555	0
2/21/1988	0	0	5,555	0
5/7/1988	0	0	41	4,166
1/16/1989	0	0	4,166	0
1/7/1990	0	0	2,173	0
1/9/1990	0	0	2,631	0
7/3/1993	7	0	500,000	0
3/23/1994	0	0	25,000	0
10/26/1995	0	0	1,333	0
1/27/1996	0	0	714	0

Date	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)
2/6/1996	0	0	500	0
7/1/1997	0	0	1,414	1,414
10/5/1998	0	0	250	0
11/21/1998	0	0	3,200	0
1/26/1999	0	0	10,000	0
2/2/1999	0	0	21,142	0
4/8/1999	0	0	1,428	0
5/6/1999	0	0	3,000	0
11/24/1999	0	0	7,500	0
11/25/1999	0.17	0	8,333	0
2/25/2000	1.2	0	12,000	0
3/7/2000	0	0	12,500	0
10/22/2001	0	0	30,000	0
1/12/2002	0	0	10,000	0
1/20/2002	0	0	16,666	0
1/30/2003	0	0	20,000	0
3/5/2004	0	0	100,000	0
12/13/2006	0	0	6,000	0
1/7/2007	0	0	750	0
11/6/2008	0	0	10,000	0
11/14/2008	0	0	5,000	0
12/27/2008	0	0	11,500	0
1/7/2009	0.2	0	800	0
6/17/2010	0	0	666	0
TOTALS	9.54	0	2,354,976	11,830

Source: SHEL DUS

Table 4.51 High Wind Events in Laramie County (NCDL): 1993-2011

Date	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)	Event Description
9/12/1993	0	0	0	0	No damage with wind gusts to 56 mph at the Cheyenne Airport.
5/19/1994	0	0	0	0	A gust of 50 knots (58 mph) was measured at the Cheyenne Airport. This strong wind was outflow from storms located to the east of Cheyenne.

Date	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)	Event Description
6/12/1994	1	1	0	0	Microburst winds roared across central and eastern Laramie county, including the city of Cheyenne, producing damage and downing trees. One woman broke her arm when the winds knocked her off balance and to the ground. Major roof damage occurred at Cheyenne.
6/12/1994	0	0	0	0	Microburst winds roared across central and eastern Laramie county, including the city of Cheyenne, producing damage and downing trees. One woman broke her arm when the winds knocked her off balance and to the ground. Major roof damage occurred at Cheyenne.
6/12/1994	0	0	0	0	A storm produced winds of 60 mph just west of Cheyenne. No damage was reported.
6/19/1994	0	0	0	0	Thunderstorms east of Cheyenne produced very strong winds estimated at 80 mph along I-80, 10 miles east of Cheyenne. No damage was reported from the winds.
7/1/1994	0	0	0	0	A violent microburst raked through a portion of south Cheyenne smashing the windows out of 15 vehicles and ripping the roof lining off a building.
7/3/1994	0	0	0	0	A thunderstorm moved through Cheyenne and produced wind gusts to 60 mph. No damage was reported.
7/10/1994	0	0	0	0	A thunderstorm produced a brief wind gust of 60 mph at Curt Gowdy State Park.
7/11/1994	0	0	0	0	Severe thunderstorms developed northwest of Cheyenne and produced winds to near 60 mph and dime-size hail as they moved east.
7/13/1994	0	0	0	0	Severe thunderstorms erupted across southeast Wyoming during the late afternoon of the 15th. Three small tornadoes were spawned by the storms. Two of these developed over southern Goshen County with a third forming over the Laramie Range in eastern Alba.
7/24/1994	0	0	0	0	A super-cell developed in southeastern Goshen County early in the evening of the 17th and moved south across extreme eastern Laramie County. Large hail and damaging winds were observed with the storm which broke out all the windows on the north side of a building.
7/11/1995	0	0	4,000	0	Strong, small scale winds from a thunderstorm tore the metal roof off of a barn six miles southeast of Cheyenne. Debris was scattered 200 yards. Damage area was 200 feet long and 40 feet wide.
8/11/1995	0	0	0	0	Thunderstorm winds broke a three inch diameter tree in Cheyenne.

Date	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)	Event Description
9/5/1995	0	0	0	0	Thunderstorm winds gusted to 60 mph, ten miles northwest of Cheyenne.
7/31/1996	0	0	500	0	Thunderstorm winds downed a six inch tree limb on the south side of Cheyenne.
7/31/1996	0	0	5,000	0	Thunderstorm winds blew a one foot diameter tree onto a car. In addition, the winds blew a truck off the road in town.
8/20/1996	0	0	0	0	
6/1/1997	0	0	0	0	
6/2/1997	0	0	0	0	
8/12/1997	0	0	0	0	Reported at F.E. Warren Air Force Base.
8/12/1997	0	0	0	0	Reported at USAF personnel.
8/13/1997	0	0	0	0	Reported by USAF personnel.
8/16/1997	0	0	500	0	Large cottonwood tree blown down at F.E. Warren Air Force Base.
8/16/1997	0	0	0	0	
8/21/1997	0	0	0	0	Tree branches broken.
5/10/1998	0	0	1,000	0	Wind gusts of 69 mph were reported in Pine Bluffs.
6/30/1998	0	0	0	0	A storm produced wind gusts up to 60 mph, 20 miles northeast of Cheyenne.
7/2/1998	0	0	0	0	A wind gust of 70 mph was recorded in a thunderstorm 33 miles northeast of Cheyenne.
7/14/1998	0	0	0	0	A number of high based thunderstorms passed over southeast Wyoming and produced wind gusts of 60 to 70mph. At 1725 MST, a gust of 70 mph was reported at Old Fort Laramie.
7/15/1998	0	0	0	0	
7/21/1998	0	0	2,000	0	A large severe thunderstorm 45 mile northeast of Cheyenne, developed a strong outflow which spread 70 mph winds across Laramie County.
9/3/1999	0	0	0	0	Wind gusts to near 60 MPH.
8/3/2000	0	0	0	0	
8/3/2000	0	0	0	0	
6/9/2001	0	0	0	0	Several wind gusts in excess of 50 knots.
7/8/2001	0	0	0	0	
6/6/2005	0	0	0	0	Dry microburst wind gust.
6/6/2005	0	0	0	0	Microburst winds blew shingles off a roof.
9/21/2005	0	0	0	0	Strong thunderstorm outflow winds from west to north of Cheyenne, WY.
9/27/2005	0	0	0	0	58 mph wind gust recorded at Cheyenne, WY, with unofficial gust to 74 mph 12 miles west of Cheyenne.

Date	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)	Event Description
5/22/2006	0	0	500	0	Weak thunderstorm produced outflow winds which blew over a portion of a fence in Cheyenne, WY.
7/20/2006	0	0	10,000	0	Thunderstorm winds blew shingles off a roof west-southwest of Burns, WY, and removed a barn roof 3 miles south of Burns, WY.
5/3/2007	0	0	30,000	0	Strong microburst winds produced some damage to mainly the western side of Cheyenne, including a report of a trailer blown into a power pole. Some damage to signage occurred along with damage to a dugout building at a local ballpark. Some hail up to ¾ inch in diameter was also reported.
5/3/2007	0	0	0	0	A line of strong to severe thunderstorms moved across parts of southeast Wyoming producing hail, with a microburst causing some damage in Cheyenne.
6/24/2007	0	0	0	0	A weak storm produced a microburst near Burns, WY.
7/16/2009	0	0	0	0	An isolated weak thunderstorm produced a dry microburst in the vicinity of Laramie, WY. Dry microburst wind gust.
5/9/2010	0	0	600	0	During the late evening and overnight hours thunderstorms developed over Cheyenne and moved northward. Large hail and damaging winds occurred with these storms. Shop doors blown off. Wind gusts measured by Davis Instruments equipment.
5/9/2010	0	0	2,500	0	During the late evening and overnight hours thunderstorms developed over Cheyenne and moved northward. Large hail and damaging winds occurred with these storms. Out building had roof removed.
5/9/2010	0	0	0	0	During the late evening and overnight hours thunderstorms developed over Cheyenne and moved northward. Large hail and damaging winds occurred with these storms.
5/9/2010	0	0	4,000	0	During the late evening and overnight hours thunderstorms developed over Cheyenne and moved northward. Large hail and damaging winds occurred with these storms. House had roof damage.
5/18/2010	0	0	50,000	0	Southeast low level wind flow increased ahead of a low pressure system over northern Colorado the afternoon of May 18 2010. A strong low level southeast jet combined with dynamics of the low to create a favorable environment for severe weather.

Date	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)	Event Description
5/18/2010	0	0	3,000	0	Southeast low level wind flow increased ahead of a low pressure system over northern Colorado the afternoon of May 18 2010. A strong low level southeast jet combined with dynamics of the low to create a favorable environment for severe weather.
5/18/2010	0	0	5,000	0	Southeast low level wind flow increased ahead of a low pressure system over northern Colorado the afternoon of May 18 2010. A strong low level southeast jet combined with dynamics of the low to create a favorable environment for severe weather.
5/26/2010	0	0	0	0	As ridge of high pressure moved eastward over the central plains, the circulation of the high pressure pushed moist air into southeast Wyoming. With a mostly clear sky the surface was able to warm during the afternoon.
5/26/2010	0	0	1,000	0	As ridge of high pressure moved eastward over the central plains, the circulation of the high pressure pushed moist air into southeast Wyoming. With a mostly clear sky the surface was able to warm during the afternoon. Three quarters of a mile of fence was pulled out of the ground by strong thunderstorm winds.
6/7/2010	0	0	0	0	Moist southerly winds brought 50 to 60 degree dew points into the area. Due to so much moisture present, low status formed and lasted through the early afternoon. The stratus caused the atmosphere to remain stable through the early afternoon.
7/2/2010	0	0	0	0	During the afternoon a short-lived severe thunderstorm developed north of Laramie and moved east over the Laramie Range. Gusty winds were the only threat with this storm. No damage was reported.
7/4/2010	0	0	0	0	Sunday, 4 July 2010 saw an upper low move through the area, causing a Tornado Watch to be issued. The area experienced low topped supercells that spawned numerous tornadoes from near Chugwater out to the southern Nebraska Panhandle.
6/1//2011	0	0	0	0	An intense storm produced strong and damaging winds in the vicinity of Albin as well as a brief tornado in Goshen County.
6/16/2011	0	0	0	0	Thunderstorms developed along the Laramie Range and moved onto the eastern plains and produced hail. Storm chaser estimated wind gusts of 60 mph.
6/30/2011	0	0	0	0	Thunderstorms developed and produced gusty straight line winds across southeast Wyoming. A NWS employee estimated wind gusts of 60 mph.

Date	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)	Event Description
6/30/2011	0	0	0	0	Thunderstorms developed and produced gusty straight line winds across southeast Wyoming. The ASOS at the airport measured a wind gust of 57 mph.
7/13/2011	0	0	0	0	Isolated severe thunderstorms developed over south central Wyoming and spread east into southeast Wyoming during the evening. The storms produced damaging wind gusts and some large hail. The public estimated a wind gust of 61pmh.
7/24/2011	0	0	0	0	Late afternoon and early evening thunderstorms produced numerous reports of large hail, as well as isolated strong winds and flash flooding across extreme southeast Wyoming. Winds were estimated at 60 mph.
8/9/2011	0	0	0	0	Evening thunderstorms produced several reports of large hail and a few occurrences of wind damage in Platte, Goshen, and Laramie counties.
TOTAL	1	1	119,600	0	

Frequency/Likelihood of Occurrence

64 damaging high wind events were recorded in Laramie County between 1960 and 2010. The probability equation is expressed as:

$$\frac{64}{50} \times 100 = 100\%$$

The probable likelihood of occurrence for this hazard was calculated to be 100%, which indicates a **highly likely** probability rating. The County is particularly susceptible to high winds in the cooler months when temperatures change between lower elevations and the nearby mountains. This is evident in the SHELDUS high wind event records, which show that most events occurred between November and April.

Potential Magnitude

Laramie County's topography can exacerbate high wind conditions. Laramie County lies in the eastern plains of Wyoming, marked by miles of prairie without natural windbreaks. High winds can speed across the plains without any obstacles, adding to the velocity and force of the wind. Wind speeds of 60mph are not uncommon in the planning area. High winds that occur in combination with severe winter storms can be especially damaging (see the Severe Winter Storms and Blizzards hazard profile).

According to the data displayed in Table 4.50, over \$2,441,526 (2011\$) in damages resulted from windstorms in Laramie County between 1960 and 2010. Given a span of 50 years between 1960 and 2010, this averages out to roughly \$47,336 in damages per year. The event of record occurred in November 1984 when \$1,250,000 in property damages was sustained.

Based on these factors, the magnitude severity rating for high wind events is considered **limited**. An estimated 10-25 percent of the planning area could be affected by high wind events. The event may cause minor injuries and minimal quality-of-life impact, and shutdown critical facilities and services for 24 hours or less.

Vulnerability Assessment

Population

The entire population of Laramie County is vulnerable to windstorms and thunderstorm winds. The availability of sheltered locations such as basements, buildings constructed using tornado-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. However, there are also segments of the population that are especially exposed to the indirect impacts of high-wind events, particularly the loss of electrical power. These populations include the elderly or disabled, especially those with medical needs and treatments dependant on electricity. Nursing homes, Community Based Residential Facilities, and other special needs housing facilities are also vulnerable if electrical outages are prolonged, since backup power generally operates only minimal functions for a short period of time.

General Property

In terms of property losses caused by any high-wind hazard, the actual damages will depend on the building density and quality of construction in the impacted area. Buildings that are close to large trees or overhead power lines are also at greater risk of suffering more extensive damages. Construction practices can help maximize the resistance of the structures to damage. Regarding severe high wind events, the planning area can expect to experience approximately \$47,336 in damages per year.

In terms of crop losses, the actual damages that occur will depend on the type of crop and the growth stage of the plants. A wind storm in a rural area in the early spring when the plants are just emerging will have much less of an impact than a storm of the same intensity occurring later in the growing season when the plants are more susceptible to damage and when there is no time to replant if the crop is a total loss.

Essential Infrastructure, Facilities, and Other Important Community Assets

High-wind events can wreak havoc on above-ground infrastructure such as power and communication lines. Downed power and communications transmission lines, coupled with disruptions to transportation, create difficulties in reporting and responding to emergencies.

Natural, Historic, and Cultural Resources

Natural, historic, and cultural resources generally experience the same vulnerabilities outlined in *General Property* and *Essential Infrastructure*. High winds can cause physical damage to buildings or even vegetation. Historic buildings built prior to building codes may be more susceptible to wind damage. High winds may not directly damage buildings or above-ground utility lines, but can topple trees or break branches which end up damaging infrastructure.

Summary

Overall, severe high wind events are a **high** significance hazard in Laramie County and the City of Cheyenne. It is a **medium** significance hazard in Albin, Burns, and Pine Bluffs.

PROPERTY AFFECTED: Medium

POPULATION AFFECTED: High

PROBABILITY: Highly Likely

JURISDICTION AFFECTED: County, City of Cheyenne, Town of Albin, Town of Burns, Town of Pine Bluffs

4.2.13 Winter Storms and Blizzards

Hazard/Problem Description

The National Weather Service defines a storm as “any disturbed state of the atmosphere, especially affecting the Earth’s surface, and strongly implying destructive and otherwise unpleasant weather.” Winter storms, then, are storms that occur during the winter months and produce snow, ice, freezing rain, sleet, etc. Winter storms are a yearly occurrence in climates where precipitation may freeze and are not always considered a disaster or hazard. For the purposes of this planning element, severe winter storms are those which produce heavy snow, significant ice accumulation, or prolonged blizzard conditions. The National Weather Association (NWA) Online Glossary does not define a ‘severe winter storm.’ However, it does define a Severe Local Storm as “A convective storm that usually covers a relatively small geographic area, or moves in a narrow path, and is sufficiently intense to threaten life and/or property.” Therefore, while the term ‘severe winter storm’ is not an official term from the NWA, it is drawn from other official definitions and is intended to reflect these standards as much as possible while still addressing the specific needs of this plan. Disasters occur when the severe storms impact the operations of the affected community by damaging property, stalling the delivery of critical services, or causing injuries or deaths among the population.

Winter storm watches and warnings may be helpful for determining the difference between a seasonal winter storm and a severe winter storm. Warnings are issued if the storm is producing or suspected of producing heavy snow or significant ice accumulations. Watches are usually issued 24 to 36 hours in advance for storms capable of producing those conditions, though criteria may vary between locations. Winter Weather Advisories are issued when a low pressure system produces a combination of winter weather that presents a hazard but does not meet warning criteria.⁴

Heavy snow can immobilize a region, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns. Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days until damages are repaired. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibilities to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents can result with injuries and deaths.

Winter storms in Laramie County, including strong winds and blizzard conditions, may cause localized power and phone outages, closures of streets, highways, schools, businesses, and non-essential government operations, and increase the likelihood of winter-weather related injury or death. People may be stranded in vehicles or other locations not suited to sheltering operations or isolated from essential services. A winter storm can escalate, creating life threatening situations when emergency response is limited by severe winter conditions. Other issues associated with severe winter storms include the threat of physical overexertion that may lead to heart attacks or strokes. Snow removal costs can pose significant budget impacts, as can repairing the associated damages caused by downed power lines, trees, structural damages, etc.

Geographical Area Affected

Winter storms are a yearly feature of the Wyoming climate and may occur anywhere in the state. Generally, severe winter storm events are considered regional, which implies that the storms impact multiple counties simultaneously, often for extended time periods. It is possible for the geographic extent of the hazard to vary significantly within a single county- a regional storm may directly impact only a small portion of the planning area while still extending over a large portion of the surrounding area. However, even in these instances, the impacts and affects of a regional hazard are still felt within the planning area. Therefore, while the percent of the

⁴ This information is drawn from the National Weather Association Online Glossary, which may be accessed at <http://www.weather.gov/glossary/>

planning area directly affected ranges from less than 10% to 100% depending on the specific circumstances, if any portion of the planning area is impacted by the storm, then the entire planning area suffers indirect impacts.

Based on this information, the geographic extent rating for severe winter storms is **extensive**.

Past Occurrences

The winter storm history in Laramie County was obtained from SHELDUS, NCDC, and the 2011 Wyoming HMP. There have been several winter storms in Laramie County that have caused great damage, economic impact, and brought about change in livestock practices. Some of the most significant storms are described in Table 4.52.

A limitation of the data used to obtain a winter storm history is the extent of record. The extent of record for SHELDUS and NCDC extends from the mid-20th century to 2010 (for SHELDUS) or 2012 (for NCDC). The historic winter storm event table from the 2011 Wyoming HMP extends from 1871 to 2006.

Table 4.52 Severe Winter Storms and Blizzards in Laramie County (HMPC): 1871-2006

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Cheyenne to Rock Springs to Fort Washakie		12/02/1871	12/04/1871					A blizzard began on the evening of December 2 nd and lasted two days, affecting the entire length of the tracks across Wyoming. A train was stranded by snowdrifts blocking the tracks. Work trains were sent out from both the east and the west ends to clear the tracks. However, the winds continued to blow so severely the tracks were blown full of snow and closed almost as fast as they were cleared. Finally, after several days of strenuous efforts, both work crews and the hungry passengers reached safety. The pattern for the next three months was set. Drifts went up to 15 feet high.
Statewide		1886	1887	Several	Several		Loss of 50% of livestock operations	The winter of 1886-1887 was the earliest severe economic disruption. The snow that winter came early and grew very deep. Then, a freak thaw turned much of this to water. As cold weather moved back in, this froze into a crust of ice, which prevented cattle getting through to the forage underneath. These conditions, accompanied by blizzard of unusual severity, caused a loss of over 50 percent among the State's livestock operations. The snow was six feet deep on the level between Mountain Home and Woods Landing. On February 12, 1887 the storms were still raging over the State, and the snow was packed so hard that stages could drive over it. Trains were stalled on their tracks. The winter of 1886-1887 sounded the death knell of the open range cattle business as it had been during previous years. The real disaster to cattlemen had been in the winter of 1886, which has been called "The Equalizer". My father a boy of 8 at the time recalls that spring of 1887. In certain sheltered area he and companions amused themselves stepping from one carcass to another without ever setting foot to the ground.
Statewide		11 January 1888	13 January 1888	great loss of life			Thousands of cattle	This blizzard covered a number of states. The combination of strong winds, snow and rapid temperature drops made it very dangerous. Loss of life was great and thousands of cattle died.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Southeast Wyoming		10/20/1906	10/23/1906					An unusually heavy and prolonged autumn snowstorm in southeast Wyoming. Twenty-three inches of snow fell in Cheyenne and numerous roads and train routes were blocked by snow.
Statewide		25 March 1931	28 March 1931	2				This blizzard covered several states. Temperatures dropped rapidly. Strong winds drifted snow badly, blocking highways for several days. Two people died in Wyoming.
Southeast Wyoming		3/14/1946	3/15/1946					A heavy snow storm occurred over the southeast portion of the State on the 14 th and 15 th . Snowfall up to 15 inches occurred at a few places during this first storm.
Statewide		6/11/1947	6/12/1947			250,000		Heavy Losses were experienced in livestock during the storms on June 11-12 and 20-21. One rancher in the Cheyenne area reported losses of approximately \$15,000, and in Natrona County losses are estimated at \$125,000. It is estimated that the losses throughout the State from these two storms will run to approximately a quarter of a million dollars. These losses were confined entirely to newly shorn sheep and young lambs. Some damage resulted to the bean crop and wheat by frost following the storm of June 11-12, but the principal damage was to gardens.
Cheyenne	Laramie	6/20/1947	6/21/1947			15,000		Heavy Losses were experience in livestock during the storms on June 11-12 and 20-21. One rancher in the Cheyenne area reported losses of approximately \$15,000, and in Natrona County losses are estimated at \$125,000. It is estimated that the losses throughout the State from these two storms will run to approximately a quarter of a million dollars. These losses were confined entirely to newly shorn sheep and young lambs.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
	Laramie, Albany, Carbon, Campbell, Crook, Niobrara, Goshen, Weston, Platte, and Converse	1/2/1949	2/20/1949	17		9,000,000 Livestock losses were great		Most significant blizzard in Wyoming's history. Snowfall measured up to 30 inches, with drifts 20 to 30 feet high. Within 24 hours of the storm initiation, all bus, rail, and air traffic was halted. There were thousands of stranded motorists and rail passengers. Thirty-three hundred miles of state highway lay in the storm area. There was an estimated loss of 15% of the State's cattle. Seventeen people perished, along with 55,000 head of cattle and more than 105,000 sheep. As the storm continued, Wyoming cities began to run out of food in the stores. Several other blizzards followed the first. "It is estimated from reports of field men that 4,194 people received aid through the Interior Department operations; that 104,839 cattle and 421,479 sheep were relieved; and that help was given to 994 ranches. A total of 12,894 miles of roads and feed lanes were opened; 1,457 tons of food, fuel, and other supplies were hauled over opened roads or made available; and the total number of operated machine hours, for snow moving equipment only totaled 18, 310. Wind speeds were 30 to 78 mph with an average of 55 mph. The temperature was below zero. Funding: \$200,000 initial relief, later an additional \$500,000, federal government turned over \$125,000. Out of the \$700,000 appropriated, more than \$450,000 was returned. Damage and cost: Highway department normally spent \$265,000 for snow removal, this storm generated costs of \$618,029.50; total economic loss is estimated at more than \$9 million. Time spent: December through March snow removal equipment spent 139,000 hours; man-hours amounted to 201,000 hours. Cost of these operations to the government is estimated at \$169,550.64, with a unit total cost of approximately \$13.15 per mile of road opened and approximately \$9.25 per operated hour or snow moving equipment.
Statewide		25 March 1950	27 March 1950	1				Heavy snow and strong winds covered much of several states, including Wyoming. Snowfall up to 60 inches fell in Wyoming. There was widespread damage to power lines and many cars and trains were stranded. Drifts were up to 16 feet and one person died in the state.
Statewide		18 February 1955	20 February 1955	4				This blizzard covered several states, including Wyoming. Up to 11 inches of snow fell with winds to 65 mph and temperatures below zero. There were 4 deaths in Wyoming.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Southeast Wyoming	Laramie, Niobrara & Goshen	4/11/1955						A severe snowstorm covered the southeast portion and was confined to the counties of Laramie, Goshen, and Niobrara. This storm began on the 11 th and lasted less than 24 hours. As much as 30 inches of snow fell during the storm and strong winds piled the snow into drifts that blocked all roads. Due to the fact that the storm was of short duration, livestock losses were kept at a minimum and warm temperatures following the storm soon melted the snow. Much needed moisture resulted from these two storms.
Eastern Wyoming		11/1/1956	11/3/1956					A severe blizzard on November 1-3 wrought general havoc in the eastern half of Wyoming; transportation was disrupted, utilities damaged, and livestock lost.
Carpenter 3 E	Laramie	3/5/1957						Carpenter 3 E reported a severe blizzard which began about 10pm of the 5 th and continued until midnight.
Statewide		22 March 1957	25 March 1957					Heavy snow fell over several states, including Wyoming. Drifts were from 10 to 25 feet deep and many motorists were trapped in cars or snow bound in towns.
Cheyenne	Laramie	3/22/1957						On the 22 nd the wet snow followed by freezing temperatures produced hazardous, icy conditions, and poor visibility on a highway about five miles north of Cheyenne. Cars from both directions skidded on a hill and stalled, blocking the highway, or slid into the ditches beside the road. Later approaching cars, unable to stop, collided with those already disabled and immobile. About ten cars in all were involved. Fortunately only one man suffered bruises. Some damage to cars was incurred.
Southeast Wyoming		5/13/1961	5/14/1961					Thunderstorms and rain showers began on the 12 th , then early on the 13 th rain turned to snow and continued with drifting throughout the day and stopped about 0330 MST on the 14 th . Hundreds of motorists were stranded and much damage was done to power and telephone lines. Some damage was done to trees and some crops were damaged by runoff. There were numerous minor auto accidents due to low visibility.
Statewide		28 October 1961		5	4	\$27,500	\$0	Snow accompanied by high winds began early afternoon and continued through the evening. Three people were killed and four were injured in auto accidents caused by low visibility. Two hunters were lost and died in the storm.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
All of Wyoming		15 September 1965	17 September 1965	0	0	\$2,750,000	C	A cold wave moved over the state the evening of the 15th and caused considerable damage to crops, trees, power and phone lines, stopped much of the transportation by closing roads, caused an estimated 5% shrinkage in marketable livestock and a few death losses in livestock. Temperature dropped quite low for so early in the season and the heavy (18"-22") band of snow from the southwest part of the state to the northeast part was by far the heaviest so early in the season.
Eastern Wyoming		4/29/1967	4/30/1967			275,000		Heavy snowstorm began early evening spreading over eastern Wyoming with strong winds. Considerable damage was done to power and phone lines. Highways were blocked with travel halted. Stockmen in northeast quarter of the state lost stock especially newborn calves and lambs.
Southern Half		4/2/1968	4/3/1968	3		275,000		A blizzard started early evening on the 29 th of April and continued to late on the 1 st of May accompanied by strong winds. Damage was done to communication lines, electric lines, transportation was halted, and several thousand sheep and cattle were killed.
Statewide		13 March 1973	14 March 1973	0	0	\$275,000	C	Heavy snow and strong winds blanketed the state, with roads, streets, and farms and ranches blocked. There were numerous power and communications outages as well as livestock losses.
Statewide		27 March 1975	28 March 1975	0	0	\$2,750,000	C	A severe blizzard with winds 40 to 50 mph and gusts to 75 mph, snow and temperatures down to 0 degrees started the morning of the 27th and continued to the evening of the 28th. Highways were blocked and some people stranded for varying times but all rescued. Some damage to signs, windows, trees, etc., but most damage to livestock, especially new born, and to cows (udders frostbitten, etc.). The storm was most severe over the eastern half of the state and most of the damage was there also.
Most of Wyoming		31 December 1975	01 January 1976	0	0	\$275,000	\$0	Heavy snow with strong winds began early on the 31st of December 1975 and continued through most of the State through most of the storm. Livestock losses were minimal and most of the damage is attributed to loss of time, cars stuck, rescue missions and snow removal.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
SE Wyoming	Laramie, Albany, Platte, and Goshen	3/10/1977	3/11/1977			275,000		Blizzard got underway about noon and soon blocked traffic and high winds caused damage to trees, power lines, and roofs in Laramie, Platte, and Goshen Counties.
All of Wyoming		16 November 1977	19 November 1977	1	0	\$275,000	\$0	Snow with large accumulations entered the state the afternoon on the 16th, accompanied by very cold temperatures. Some blowing and drifting caused hazardous driving conditions in many areas. The snow ended by the morning of the 18th but was quickly followed by strong gusty westerly winds which moved the large amounts of loose snow into ground blizzards with severe problems on highways, ranches, etc. One man was killed at Rawlins as he tried to walk into town along the interstate from the west. Numerous people were stranded along the highways and in towns and ranches until the roads were opened.
Statewide		05 December 1978	07 December 1978	0	0	\$275,000	\$0	This very heavy snowstorm dumped over a foot of snow across much of the state causing road and airport closures in many areas throughout the state. Winds gusting to 75 mph caused extensive blowing and drifting snow, stopping both local and interstate travel. This storm isolated livestock from ranchers, contributing to subsequent substantial losses of cattle and sheep in Wyoming.
5 miles west of Cheyenne	Laramie	12/22/1978				275,000		Wind gusts estimated to 85 mph blew four Union Pacific freight cars off their tracks west of Cheyenne. Other personal property damages were reported as well. Extensive blowing and drifting snow caused snow drifts up to 17 feet high in some exposed areas west of Cheyenne.
Statewide		01 January 1979	31 January 1979	0	0	\$2,500,000	C	Numerous heavy snows combined with prolonged extremely cold temperatures have caused widespread damage across much of Wyoming during the month of January. Estimated loss of 2700 sheep and 2000 cattle with projected losses of calves and lambs to 35,000 head are reported. Also, numerous towns and communities across the state have extensive damages to their water systems due to frozen water mains and sewer systems. Emergency Winter Storm Relief Aid of \$2.5 million is currently being asked for by the State.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Southeast Wyoming	Albany, Goshen, Laramie, and Platte	11/19/1979	11/21/1979			275,000		Snow began falling at 1600 MST on the 19 th , changing to blizzard conditions by mid-morning on the 20 th . Roads were blocked, travelers stranded, schools closed, and businesses disrupted. A 26-inch snowfall at Cheyenne broke records for November. Some country roads were still not open by the end of the month. While there were no reported losses of livestock, hay was airlifted to some cattle that were without feed for about a week.
Statewide		10 January 1980		0	0	?		Much of the state was paralyzed. Freak thunderstorms occurred in Casper, Riverton, and Lander areas. Roads were closed and some motorists stranded. Interstate 25 from Laramie to the Utah state line was closed by winds approaching 80mph in south-central Wyoming. An estimated 60 vehicles were in the ditch along I-80 west of Rawlins. Reported 90 mph winds in Medicine Bow blew out car and truck windows and a large window in a cafe. Many schools were closed.
Statewide		25 January 1980	27 January 1980	4	?	?		Snow and blowing snow from the morning of the 25th to the evening of the 27th swept across Wyoming dumping a record 11 inches of snow on Cheyenne in a 12-hour period. Heavy snow and slick road surfaces due to bitter cold temperatures closed many highways and interstates, including I-80 from the Nebraska state line to Rock Springs. Near Bitter Creek Hill, 38 miles east of Rock Springs, 21 cars and trucks were involved in a pile-up on the afternoon of the 25th. Two men were killed at 7 p.m. on the 26th, 9 miles east of Powell when the driver lost control, ejecting both men. One fatality occurred on the 27th at 11:30 a.m. on I-80 near Rock Springs when a car slowed down because of poor visibility and slick roads and the truck driver, trailing the vehicle, failed to slow down in time and crushed the back end of the car in which the victim was riding. A man died about 12:45 p.m. on the 27th when the flatbed truck he was driving 95 miles south of Gillette jack-knifed on a left-hand curve and rolled on its top. Schools in Cheyenne were closed at noon on Friday and did not reopen until Wednesday. Most churches in Cheyenne remained closed on Sunday. Casper thermometers dipped to record lows of -27 degrees on Saturday, -28 degrees on Sunday night, and -32 degrees Monday morning. Cheyenne reported temperatures at 0 or below zero for a period of 79 hours. Weather-related problems may have caused the derailment of 12 empty freight cars at Point of Rocks at 6:45 a.m. on the 25th.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Statewide		14 October 1980	16 October 1980	4	5	?	\$0	Snow beginning on the evening of the 14th moved across the state leaving 13 inches in Laramie and 11 inches in Rawlins. Most other areas received from 1-3 inches. Some highways were closed on the 16th, including Interstate 80 between Cheyenne and Walcott Junction (100 miles). One person was killed and three others injured in a storm-related two-vehicle accident southwest of Cody on the 15th. The storm apparently contributed to a light plane crash that killed one man near the airport at Rock Springs at 9:10 p.m. on the 15th. Blizzard-like conditions were contributing factors when a freight train plowed into the caboose of a grain train 13 miles southeast of Laramie about 4 p.m. on October 16, killing two crewmembers and injuring two others. Schools in Laramie, including the University of Wyoming, were closed on the 16th. Many hunters were stranded. Tree limbs snapped causing power outages in Rawlins and Sinclair.
Eastern Wyoming	Crook, Weston, Campbell, Niobrara, Albany, Platte, Goshen, and Laramie	10/8/1982	10/9/1982			100,000		An early fall storm swept across the mountain and plains of Wyoming Friday night and Saturday. The storm buried the Bear Lodge Mountains and the Moskee area south and east of Sundance in Crook and Weston Counties with up to 5 feet of wet snow. An estimated 4,000 cattle still on summer ranges were stranded. Rescue efforts estimated at \$100,000 lasted from the 11 th to the 17 th . Elsewhere in the east plains, high winds with record peak gusts to 65 mph at Cheyenne, 54 mph at Sheridan, 53 mph at Laramie, and 50mph at Gillette, caused blowing snow and reduced visibilities to zero in some areas.
	Fremont, Hot Springs, Carbon, Albany, Natrona, Converse, Sheridan, Johnson, Campbell, Platte, Goshen, Laramie, and Niobrara	12/1/1982		1				A major winter storm dumped heavy snow in the state Wednesday and Thursday morning. Casper was hit the hardest with 24 inches of snow, breaking the previous 24-hour total. The Wind River Canyon between Shoshoni and Thermopolis also reported 24 inches. Elsewhere in the basins and plains, amounts varied from 5 to 11 inches. Winds to 40 mph caused blizzard conditions in the central and northeast areas causing drifts of 5 to 8 feet deep. One death was attributed to this storm.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
	Fremont, Natrona, Converse, Albany, Platte, Goshen, and Laramie	12/23/1982	12/24/1982					A major winter storm through central and southeast Wyoming packed strong winds and moderate to heavy snow. Shoshoni experienced winds that exceeded 60 mph causing over-turned trailers and a boat at the Boysen Lake Marina. Casper recorded a record 29 inches of snow from the storm. Lander and Cheyenne accumulated around 6 inches each. Strong winds gusting into the 40 mph range caused blizzard conditions which forced the closure of many highways in central and southeast areas, stranding holiday travelers.
	Crook, Campbell, Weston, Natrona, Albany, Platte, Goshen, Laramie, Sweetwater, Lincoln, and Uinta	3/5/1983	3/6/1983			2,750		A major winter storm deposited a blanket of snow varying from 4 to 16 inches over east and south Wyoming stranding over 250 travelers in Laramie alone. All roads in and out of Cheyenne and Laramie were closed with additional closures between Rawlins and Evanston. Winds averaging 25 mph and gusting to near 40 mph in many areas caused ground blizzards.
All but northwest and north central Wyoming		4/12/1983	4/13/1983					A two-day storm buried most of the state with 6 to 15 inches of snow. Some mountain locations near Casper received up to 2.5 feet of snow. In addition, north winds of 25 to 40 mph caused near blizzard conditions mainly in the southwest and southeast with many roads closed. Power also was interrupted for up to 6 hours in quite a few areas of the state.
Southern half of Albany	Laramie	4/21/1983	4/22/1983					An unusual storm dumped up to 22 inches of heavy wet snow in the Laramie vicinity. The snow occurred near a freezing level of 7,200 feet, which is very close to the elevation of the area. The rest of southern and eastern Wyoming reported only rain. Power outages were widespread, with the entire city of Laramie without power at one time or another.
Southeast Wyoming	Albany, Laramie, Platte, Goshen	5/17/1983						Another spring snowstorm blanketed southeast Wyoming with 1 to 2 feet of snow. Strong winds gusting up to near 50 mph caused near blizzard conditions in the morning. All major roads in the area were closed for the day, and numerous traffic accidents were reported.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Statewide		20 December 1983	25 December 1983	0	?	\$2,750,000	\$0	The worst arctic outbreak ever in December hit WY full force with almost all of the state remaining below zero for five days. Overnight lows in the 20 to 40 below range were common, with quite a few towns setting record Dec lows. Most WY residents fared much better in the cold than mechanical items. A malfunctioning transformer left the town of Lander without power for 12 hrs., and the extreme temperatures damaged numerous vehicles. The greatest damage, however, occurred to homes and businesses as hundreds of water pipes froze and burst. The State Capitol Building in Cheyenne, for example, suffered almost a quarter of a million dollars damage due to burst water pipes.
Cheyenne	Laramie	2/14/1984						A localized blizzard whipped a 6-inch snowfall into 5-foot drifts as winds howled at over 40 mph. All roads around Cheyenne were closed for the night, and several areas had power outages lasting up to 6 hours.
Southeast Corner of Wyoming		4/20/1984				2,750		A large spring storm dumped up to 2.5 feet of snow on southeast Wyoming. At Cheyenne a fall of 17 inches of snow in 24 hours set a new April record. All major highways around Cheyenne were closed for about 12 hours during the storm. Some livestock were lost in the snowstorm, and some winter wheat crops were damaged.
	Albany and Laramie	9/27/1985	9/28/1985				2,750,000	Heavy snow hit the southeast corner of the state. Twelve inches of snow was reported near Granite Reservoir in extreme east Albany County, followed by 8 inches at Easterbrook. In Laramie County, a maximum of 7 inches was reported about 25 miles west of Cheyenne; near zero temperatures on the morning following the storm devastated the potato crop in the eastern part of the county.
	Platte and Laramie	4/3/1986						Sustained winds and heavy, wet snow at Rock Springs caused numerous power outages due to downed lines.
Southeast		1/28/1987	1/29/1987	1				Several gusts near 70 mph were observed at Vedauwoo around 1330 MST on the 28 th . Gusts from 60 to 70 mph were also logged at Cheyenne airport from 2200 MST on the 28 th to 0205 MST on the 29 th . Wind gusts to around 60 mph were common at other locations over the southeast. The strong winds, coupled with blowing and drifting snow, reduced visibilities to near zero, mainly over the higher elevations from Rawlins to Cheyenne. These areas of blowing and drifting snow contributed to a fatal car accident one mile west of Arlington along I-80 during the evening of the 28 th . High winds caused power blackouts across Torrington.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
	Platte, Goshen, and Laramie	12/10/1987				275,000	2,750	On December 10 a vigorous cold front that entered far west Wyoming on December 9 swept through the state. 4 to 6 inches of new snow fell with 8 inches at higher elevations over northwest Wyoming and the Wind River Mountains during the early morning hours. Very strong wind gusts were associated with this cold front as it moved over eastern Wyoming. From 0300 MST to 0830 MST very strong wind gusts of 65 to 70 mph were clocked. These very strong wind gusts stretched from Sheridan airport in the north to the Missouri Basin Power Plant in the south. Platte and Goshen Counties were raked by extremely intense wind gusts between 75 and 80 mph between 0830 and 1100 MST. A few of these gusts were estimated to be more than 90 mph. Numerous 18-wheel semi-tractor-trailers were blown over Douglas to Cheyenne. A 50-foot four-legged microwave tower located about 12 miles east of Wheatland was blown down about 1030 MST. Two of the four legs were pulled completely out of the ground still in the concrete anchors. Damage to this tower was around \$55,000. A house trailer being pulled on I-90 south of Sheridan was completely destroyed. A few trees more than 20-foot tall from Buffalo in the north to Pine Bluffs in the south were toppled. A multitude of blown over roofs and power poles and downed fences were reported across much of eastern Wyoming.
Yellowstone National Park, Southeast Wyoming		12/21/1987				2,750		A fairly moist but strong upper level westerly flow dumped 4 to 8 inches of new snow over Yellowstone National Park. This strong westerly flow produced wind gusts around 60 mph from 0130 to 0500 MST at Cody Regional Airport. These strong westerly winds continued to move into southeast Wyoming during the morning and the afternoon. Shortly before 0300 MST Natrona County Airport near Casper recorded a wind gust to 43 mph. From 0500 to 1330 MST sustained winds of 35 to 45 mph were clocked from Rawlins to Cheyenne along I-80. These strong winds were also observed from Wheatland to Cheyenne. Very strong wind gusts from 0500 to 1030 MST reached speeds of 58 to 64 mph at the Cheyenne airport. Construction damage due to these high winds was reported in the Cheyenne area.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Southeast Wyoming		12/27/1987						A very strong upper level trough developed over Arizona on the 25 th and moved into eastern Colorado on the morning of the 27 th . This trough developed blizzard conditions over southeast Wyoming from 0700 to 1800 MST. Snowfall amounts varied from 6 to 20 inches. Wind speeds over southeast Wyoming were clocked at 25 to 35 mph with gusts from 45 mph. These strong winds combined with the heavy snow amounts frequently lowered visibilities below 0.25 miles. The winds also produced over 4-foot-tall snow drifts, particularly over roadways. These included I-80 to the Nebraska border and I-25 from Douglas to the Colorado border. These roads stayed closed for much of the 27 th to the morning of the 28 th . This blizzard stranded over 300 holiday travelers in the tiny town of Chugwater. Some particular snowfall totals associated with this blizzard are Albin, 14 inches; Carpenter, 8 inches; Chugwater, 10 inches; Double Four Ranch (Albany County), 16 inches; Pine Bluffs, 15 inches; Saratoga, 9 inches; and Wheatland, 10 inches.
		1/10/1988	1/11/1988					A cold front blitzed into far west Wyoming and produced thunderstorms and 8 to 20 inches of new snow from Kemmerer north to Yellowstone National Park. Around 0500 MST wind gusts of 115 mph were recorded at the top of Rendezvous Peak at the Teton Village Ski Resort. Wind gusts of 50 to 55 mph raked across the Green River to Wind River Basin around 0530 MST. These strong winds caused short power outages at Big Piney and Pinedale during the morning of the 11 th . Also, wind gusts to 55 mph were noted in the Gillette area around 0700 MST. Carbon County sustained winds of 35 to 45 mph with gusts of 55 to around 75 mph. One peak wind gust over the southeast part of Casper reached 68 mph at 1000 MST with 71 mph at Rawlins airport at 1300 MST. During these high winds, several tractor trailer trucks were knocked down between Wamsutter and Laramie along I-80. Truck drivers along the Interstate complained the strong winds were treating their semi-tractor trailers "like kites pulling whichever way the wind was blowing." One man was injured on I-80 when two tractor trailers collided.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Central Plains, Southeast Wyoming		1/14/1988						Strong upper level westerly winds mixed down to the surface around 0500 MST and gusted to 60 mph at Cody airport. Very strong winds of 35 to 45 mph with gusts of 51 to 82 mph were clocked over the central plains and southeast Wyoming. Air Force personnel about 25 to 30 miles north of Cheyenne reported wind gusts of 82 mph. Also, Muddy Gap in northern Carbon County logged sustained winds of 45 mph with gusts of 67 mph. More than 25 auto accidents occurred with the winds and associated areas of blowing and drifting snow. Visibilities were frequently below 1 mile in the blowing and drifting snow. A small plane was rolled over at the Natrona County airport west of Casper due to the high winds. The pilot was not injured.
Eastern Wyoming		1/23/1988						A very strong upper level northwest flow of air over Wyoming mixed down and accelerated surface winds to 30 to 45 mph with gusts of 55 to 70 mph from north-central to southeast Wyoming. The most noticeable wind gusts were at Arlington, 65 mph; Casper, 70 mph; Cheyenne, 58 mph; and Sheridan, 71 mph. Also, this strong northerly airflow helped to dump 5 inches of new snow about 25 miles west of Laramie near Centennial. Most roads were closed over south-central and southeast Wyoming due to blowing snow and drifts.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Eastern Wyoming		3/10/1988	3/12/1988		5	275,000	27,500	An intense winter storm which developed over Nevada on the 9 th moved through Colorado on the 10 th and 11 th and into Kansas on the 12 th . This winter storm combined with good easterly flow over Wyoming first smashed into west and central Wyoming with 5 to 14 inches of new snow. As this winter storm moved through Colorado it intensified and produced blizzard conditions over much of eastern Wyoming from the 10 th to the morning of the 12 th . Six to 25 inches of new snow generally dumped on eastern Wyoming with this storm. Also sustained winds of 25 to 40 mph with gusts of 50 to 65 mph raked across eastern Wyoming. This heavy snow and strong winds frequently kept visibilities below 0.25 miles over much of southern and eastern Wyoming. The strong winds and heavy snow whipped snow drifts to a depth of 10 to 30 feet over eastern Wyoming due to the extremely low visibilities and blowing and drifting snow. Numerous traffic accidents occurred across the state with at least five people sustaining injuries. Travelers were stranded throughout eastern Wyoming with more than 200 people trapped at the Snowy Range Ski Resort west of Laramie. The skiers spent the night sleeping on floors and tables. The eastern plains were particularly hard hit by the blizzard from Douglas southeast to the LaGrange area. A few travelers in the eastern plains were completely trapped in their vehicles for 36 to 40 hours. Drifts ranging from 15 to 30 feet high were common around Lusk with a number of vehicles buried by the snow. Ranchers over the eastern plains were in the midst of calving and lambing season. About 15 to 35 head of calves were lost. Some noticeable snowfall totals were Albin, 18 inches; Bates Creek, 13 inches; Burgess Junction, 20 inches; Douglas, 11 inches; Gillette, 12 inches; Keeline, 10 inches; LaGrange, 21 inches; Lander, 10 inches; Laramie, 11 inches; Lusk, 20 inches; Rock Springs, 20 inches; and Snowy Range, 14 inches.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Entire State		02 February 1989	06 February 1989	0	0	\$0	\$0	Record cold temperatures gripped the cowboy state from the 2nd through the morning of the 6th, the coldest in at least 5 years. Many locations had at least 80 to 100 consecutive hours of subzero readings. Wind chills from 50 to 90 degrees below zero accompanied the cold. Most overnight lows were between minus 20 and minus 40 degrees with maximum temperatures struggling above 15 or 20 degrees below zero. On the morning of the 3rd, Sheridan set a record low of minus 32, eclipsing the old record of 24 degrees below zero, set in 1985. Casper had a record low 27 degrees below zero. The minimum at Cheyenne was minus 24, one degree shy of the record low for the 3rd, dating back to 1883. Additionally, Weston, located over far northern Wyoming, dropped to 47 degrees below zero while locations in Yellowstone Park dipped lower than minus 40 degrees. These low temperatures, including several records, were typical through the 6th. The maximum temperature for Cheyenne on the 3rd was 18 degrees below zero. Not only was that a record low maximum, but the second coldest such reading since weather records have been kept at Cheyenne, back more than 100 years. During the morning of the 6th, the temperature at the capitol city finally rose above zero. The record is 120 hours, set in December 1983. Due to this Arctic episode, February was the coldest February ever for Casper. It was also the worst cold spell for Gillette in a decade.
Statewide		21 December 1989	22 December 1989	0	0	\$0	\$0	As a result of the combination of calm winds, a bitterly cold arctic air mass and deep snow cover, extremely low minimum temperatures occurred across the cowboy state during the morning of the 22nd. Many of these temperatures were not only record lows for the date, but also the coldest ever for December. The lowest temperatures were generally over the Eastern two-thirds of Wyoming. Recluse, in the far Northeast corner, had a low of 50 degrees below zero. Other lows included 47 below in Redbird, 40 below at Douglas, 35 degrees below at both Sheridan and Gillette, 34 degrees below zero in Laramie, 28 below at both Casper and Cheyenne, 23 below in Cody, 14 below at Farson and 13 degrees below zero in Lander.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Central Plains, Eastern Plains, Southern Mountains, Laramie Valley, Southeast Plains		3/5/1990	3/8/1990					An intense slow-moving storm system caused a prolonged heavy snow event for roughly the southeastern quarter of the state. The storm lasted for about 54 hours, from the evening of the 5 th through the early morning on the 8 th . The heaviest snow occurred during the 6 th , when 24-hour snow totals ranged from 6 to 18 inches. Total snow amounts for the event were generally from 1 to 4 feet. During the 6 th and 7 th , at least 300 miles of roads were closed. Nearly all travel to and from Cheyenne, the state capitol, was halted. Additionally, there were power outages because of downed power lines due to the wet, heavy snow. Storm totals of 3 to 4 feet of snow were common at several locations in the Laramie Mountains. Some other reports included 20 inches in Centennial; 19.2 inches in Cheyenne. For Cheyenne, this was the greatest single snowfall event ever in March, and the storm tied for ninth place on the list of biggest snowstorms.
Laramie Valley		3/15/1990	3/16/1990					From the evening of the 15 th through the morning of the 16 th , strong winds occurred on the I-80 summit. Vedauwoo, 30 miles west of Cheyenne, logged 40 to 50 mph sustained winds with peak gusts up to 56 mph. The winds caused considerable blowing and drifting snow along with periods of zero visibilities. I-80 from Cheyenne to Laramie was closed during this event.
Eastern Wyoming		3/15/1990						During much of the 15 th , high winds blew across eastern Wyoming. Sustained winds of 40 to 55 mph were common. Some peak wind gusts were: 67 mph near Wheatland; 65 mph on the I-80 summit, 30 miles west of Cheyenne; 60 mph in Sheridan; and 58 mph in Gillette. These winds produced widespread blowing and drifting snow and ground blizzard conditions across the far southeastern parts of the state. During most of the 15 th , almost all roads to and from Cheyenne and Laramie were closed because of the blowing snow. It was not until the afternoon of the 16 th that the roads were reopened for travel.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Statewide		18 December 1990	22 December 1990	0	0	\$27,500	\$0	A major winter storm followed by a bitterly cold Arctic outbreak, plagued most of Wyoming for about 2 to 4 days. Heavy snows with strong winds occurred on the 18th over the far western part of the state, with up to a foot in the mountains. Light snows of 2 to 6 inches generally occurred over the rest of the state, except in the far southwest where storm totals approached 15 to 20 inches by 1800 MST on the 19th. Bitterly cold Arctic air started spilling into the state after 1200 MST on the 18th on brisk northern winds. On the 19th and 20th, wind chills dropped to -40 to -75 degrees at times in many areas. The coldest temperatures occurred on the 21st and 22nd, with most areas from -25 to -45 degrees. Minus 50 degree readings were reported at Worland and near Jackson. Casper set an all-time record-low of -41 degrees on the 21st. Major roads affected by the snow and winds were confined to the far west and southwest. The worst conditions occurred along Interstate 80 from Rock Springs to Rawlins on the night of the 19th and 20th where snow and strong winds closed the road, stranding many people. The bitter cold caused power outages in some places, most notably in Jackson. Schools and other events were widely canceled due to the cold weather.
Southeast Wyoming		3/8/1992	3/9/1992					Wind gusts to 53 mph with heavy snow reduced visibilities to near zero with a storm Sunday evening and night. The Wyoming Highway Patrol officials said 50 to 75 accidents in the state were storm related. Most roads and highways in southeast Wyoming were closed after 1800 MST. Snowy Range received up to 13 inches of snow with Cheyenne Airport collecting 10 inches of snow by early Monday.
Southeast Wyoming		11/3/1992						A localized storm brought a foot of snow and winds 20 to 35 mph to the mountains southwest of Cheyenne. Roads were closed and visibilities were frequently near zero.
Southern Wyoming		2/11/1994						Snow fell heavily at times across southern Wyoming. Eleven inches of new snow fell at Rock Springs closing I-80 for a time. Cheyenne observed near blizzard conditions that evening. Seven inches of snow combined with 35 mph gusts caused 40 automobile accidents in and near Cheyenne.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
All except the Southwest Corner		21 October 1995	23 October 1995	0	0	\$1,000,000	\$0	Heavy snow and strong winds caused blizzard conditions over much of Wyoming. Snowfall amounts ranged from four inches at Rock Springs and Gillette to seventeen inches at Casper Mountain. Generally, six to ten inches of snowfall was common. Winds gusted to 55 mph and caused blizzard conditions with drifts up to five feet deep. Reported drifts of two to four feet were common. Many roads were closed from the 22nd to the afternoon of the 23rd due to drifting and near zero visibilities. Many travelers were stranded across the state until the 23rd and a number of hunters had to be rescued. Power was out for a time in various places, due to downed power lines from the heavy snow and strong winds.
	Albany, Carbon, Converse, Fremont, Laramie, Natrona, and Sweetwater	1/20/1996	1/21/1996					Winds were sustained between 40 and 50 mph from Jeffrey City and Casper, southeast to just east of the Laramie Mountains. Wind gusts were between 55 and 65 mph, with the strongest gust being 71 mph, 10 miles south of Wheatland between 1753 and 1909 MST. Highway 191 south of Rock Springs was closed due to blowing snow from 2300 to 0600 MST.
	Albany, Carbon, and Laramie	1/23/1996	1/24/1996					Widespread blowing snow created near zero visibilities over the south central part of the state. I-80 was closed during that time from Walcott Junction to Laramie.
Platte, Goshen, Cheyenne Foothills, Pine Bluffs	Platte, Goshen, and Laramie	1/30/1996				15,000		Light snow and strong winds produced poor travel conditions and numerous accidents.
Laramie Valley, Laramie Mountains, Cheyenne Foothills	Albany and Laramie	3/18/1996						Very heavy snow showers produced 1 to 3 inches of snow from Laramie to Cheyenne along with strong wind gusts. Near zero visibilities occurred. I-80 over the Laramie Mountains was closed from 1145 MST and was reopened at 1700 MST because of the poor conditions.
Natrona, Converse, Niobrara, Laramie Valley, Laramie Mountains, Platte, Goshen, Cheyenne Foothills, Pine Bluffs	Natrona, Converse, Niobrara, Laramie, Platte, Goshen, and Albany	3/23/1996	3/24/1996					Snow and strong winds combined to produce blizzard conditions in east central and southeastern Wyoming. Visibilities were near zero and wind chill temperatures as low as 45 degrees below zero. Three to six inches of snow were common in the area, with drifts as high as 7 feet in the Cheyenne area. Many roads were closed during this time.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Converse, Niobrara, southwest Carbon, north Carbon, Snowy Range, Laramie Mountains, Laramie Valley, Platte, Cheyenne Foothills	Albany, Carbon, Converse, Laramie, Niobrara, and Platte	10/25/1996	10/26/1996					Heavy snow and strong winds created blizzard conditions in much of south central and eastern Wyoming. The snow and winds closed many roads in that area, especially in and near the southeast mountains. The heaviest snowfall was in the Laramie Mountains and Snowy Range, where 12 to 18 inches of snow was reported. Other snowfall amounts in the area were 7 inches in Laramie, 8 inches in Douglas, and 5 inches in Lusk. Only 1 to 4 inches fell in parts of the southeast plains. Winds gusted to near 50 mph and produced near zero visibilities. Drifts as high as 5 feet were observed in the Laramie Mountains between Cheyenne and Laramie. The strong winds and snow caused power outages to many rural areas in south central and southeast Wyoming.
Southwest Carbon, north Carbon, Snowy Range, Laramie Valley, Laramie Mountains, Cheyenne Foothills, Pine Bluffs	Albany, Carbon, and Laramie	1/9/1997	1/11/1997					Heavy snow that began on the 9 th and ended on the 10 th combined with strong winds to create whiteout conditions in southeast and south central Wyoming and the Nebraska panhandle. I-80 was closed between Cheyenne and Big Springs, NE due to blowing and drifting snow on the 10 th from 0100 to 0645 MST, and Nebraska Highway 71 was closed between Scottsbluff and Kimball from 0100 until 0830 MST.
Converse, Niobrara, southwest Carbon, north Carbon, Snowy Range, north Laramie Mountains, Laramie Valley, Laramie Mountains, Platte, Goshen, Cheyenne Foothills, Pine Bluffs	Albany, Carbon, Converse, Goshen, Laramie, Niobrara, and Platte	4/4/1997	4/6/1997					Strong winds combined with snow in amounts of generally 8 to 12 inches to create widespread blizzard conditions in southeast Wyoming and the Nebraska panhandle. By 2045 MST on the 4 th , all roads had been closed in and out of Cheyenne except for I-25. Closed and impassable roads because the norm from the evening of April 4 through April 6 due to blowing and drifting snow. Many automobile accidents occurred as a result of the treacherous conditions, and many power lines were downed due to the weight of snow. Many livestock were killed by the snow and accompanying cold temperatures because the storm occurred in the calving season. The highest snow amount was 12 inches at Albin and Lusk, and sustained winds were generally 40 to 50 mph through the event.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Converse, Niobrara, southwest Carbon, north Carbon, Snowy Range, north Laramie Mountains, Laramie Valley, Laramie Mountains, Platte, Goshen, Cheyenne Foothills, Pine Bluffs	Albany, Carbon, Converse, Goshen, Laramie, Niobrara, and Platte	10/24/1997	10/25/1997			100,000	10,000	An early season blizzard dumped up to 20 inches of snow in areas of southeastern Wyoming, downing power poles and power lines as well as making many roads impassable. Wet, wind-driven snow damaged trees in addition to unharvested milo, corn, and sunflower fields. Many motorists were stranded on impassable roads or when vehicles slid off roads. High School athletic events were postponed, and high school bands and athletic teams were stranded when their buses could continue no further. The following occurrences were documented as occurring on the 24 th . Semi-tractor trucks with trailers tipped over after jackknifing on I-80 near Sinclair and at milepost 340. The Wyoming Highway Patrol received 198 accident reports by 1645 MST, compared to the normal of 30 to 50. I-25 was closed from the Colorado border to Wheatland at approximately 1600 MST. I-80 was closed the entire length of Wyoming by late evening. The following occurrences were documented as occurring on the 25 th . I-80 remained closed from the Nebraska border to Rock Springs. A Wyoming Department of Transportation employee received minor injuries when the snow plow he was operating flipped over east of Cheyenne. Postal delivery service from Cheyenne was shut down for the first time in at least 15 years. Two hunters were rescued in the Snowy Range near Arlington after spending the previous night in the Medicine Bow National Forest. The Wyoming Highway Patrol received 252 accident reports since 0800 MST on the 24 th , several times the normal figure.
Laramie Valley, Laramie Mountains, Cheyenne Foothills, Pine Bluffs	Albany and Laramie	12/8/1997	12/11/1997	1	36	100,000		Winter storm conditions caused by fresh snow and strong winds contributed to 76 accidents from 2200 MST on the 8 th to 1700 MST on the 10 th in Laramie and Albany counties. Seventeen of the accidents involved injuries. Twenty-one passengers on a bus were injured on the 10 th when the bus rear-ended an eastbound semi-truck approximately 14 miles west of Cheyenne. On the 11 th , a 73-year old woman died while trying to reach her ranch on foot after her vehicle became disabled. Her body was located in an abandoned mobile home approximately 0.5 mile from her vehicle, near the Horse Creek Ranch along the county line between Laramie and Albany counties. The temperature at the time was approximately -20° with wind chills in the vicinity of -70°. F73OU

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Cheyenne Foothills - Pine Bluffs	Albany, Goshen, Laramie, Niobrara, and Platte	12/27/1997	12/28/1997					Ground blizzard conditions were created by strong winds blowing over freshly fallen snow. Near zero visibility was reported at Horse Creek and on Wyoming Highway 20 between Keeline and Lusk at 1815 MST. Vehicles were stranded around Lusk, and hotels and churches in Lusk were filling up with stranded travelers. Between 2130 and 2215 MST, area roads were closed by officials in Cheyenne, Laramie, Wheatland, and Torrington due to blowing and drifting snow coupled with poor visibilities. Sustained winds of 45 mph were recorded 32 miles NE of Cheyenne between 2000 and midnight MST, and Cheyenne recorded a wind gust of 67 mph at 1056 MST.
Laramie Valley, Laramie Mountains	Albany and Laramie	2/15/1998	2/16/1998			21,000		Light snow created icy roads across Laramie and Albany counties resulting in 14 accidents across the area. No injuries or major property damage was reported.
North Carbon, Laramie Mountains	Albany, Carbon, and Laramie	10/5/1998						Law enforcement officials reported that the summit of I-80 and Highway 210 were closed due to whiteout conditions at the higher elevations of these roads. The town of Buford also had whiteout conditions.
Cheyenne Foothills	Laramie	12/9/1998			1	30,000		Icy roads brought the closure of I-25 from Cheyenne south to the Colorado border. Six traffic accidents occurred on I-25 and 3 occurred on I-80 on the icy roads. One person in one of the accidents sustained minor facial injuries.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Southwest Carbon, north Carbon, Snowy Range, Laramie Mountains, Cheyenne Foothills, Pine Bluffs	Albany, Carbon, and Laramie	12/18/1998	12/19/1998					A winter storm dumped 12 to 18 inches of snow on the southwest mountains, and 8 to 10 inches of snow on parts of the adjacent plains. Interstates 80 and 25 in southeast Wyoming were closed due to icy conditions and poor visibilities.
Laramie Mountains, Cheyenne Foothills		3/5/1999		1	3	50,000		Blowing snow and icy roads caused several accidents on Interstates 25 and 80. An accident occurred at 1516 MST west of Cheyenne when a man lost control of his pickup on the ice. The truck flipped over into the ditch. The man, his wife, and 3 daughters were not injured in the accident. However, while waiting on the side of the road after the accident, a semi-trailer traveling west jack-knifed and hit the 32-year-old mother and one of her daughters. The woman died instantly and the daughter was taken to the hospital in serious condition. Two other people were injured in a two-vehicle accident, on I-80 west of Cheyenne at 0920 MST. I-80 west of Cheyenne was closed at 1000 MST because of black ice, high winds, and the cleanup of a large number of accidents. The Interstate was reopened around 1430 MST. I-25 north and south of Cheyenne was closed from 0800 MST to 1238 MST. F32EQ
Southwest Carbon, Snowy Range, Laramie Mountains	Albany, Carbon, and Laramie	9/28/1999		1	1			Snow fell over parts of south central and southeast Wyoming, with snowfall of 8 inches reported at Elk Mountain, and 6 inches at Buford. Icy bridges resulted in an accident on I-80, 15 miles east of Rawlins, which killed one person and injured another. F68VE

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Laramie Valley and Laramie Mountains	Albany and Laramie	12/3/1999		1	4	45,000		Icy roads resulted in a couple of accidents near Laramie, with one fatality occurring in a rollover on I-80 about 6 miles west of Laramie.
Southwest Carbon, north Carbon, Snowy Range, north Laramie Mountains, Laramie Valley, Laramie Mountains, Platte, Cheyenne Foothills	Albany, Carbon, Converse, Laramie, and Platte	9/22/2000	9/24/2000			100,000		Heavy snow fell over south central and southeast Wyoming over a two-day period, with 5 to 9 inches common. Elk Mountain, reported 12 to 14 inches of snow while Cheyenne, recorded a record 10.5 inches. I-80 between Laramie and Rock Springs, as closed during much of the storm, stranding up to 1200 travelers, mostly in Rawlins.
North Carbon, Laramie Mountains, Platte, Cheyenne Foothills	Albany, Carbon, Laramie, and Platte	12/16/2000	12/17/2000					Strong winds were reported over the mountains and foothill areas of southeast Wyoming, with gusts as high as 83 mph recorded near Chugwater, and gusts up to 73 mph at Arlington. I-80 was closed for a few hours for localized conditions due to blowing snow.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Platte, Cheyenne Foothills, Pine Bluffs	Laramie and Platte	4/10/2001	4/11/2001			350,000		A powerful winter storm produced blizzard conditions over much of far southeast Wyoming, resulting in some power outages and closing many roads. All roads out of Cheyenne were closed with winds in excess of 40 mph and almost 10 inches of snow recorded, while many power poles were knocked over in eastern Laramie County. Thirteen inches of snow fell in Chugwater, with 10 to 12 inches common over much of Laramie County and the southern Laramie Mountains.
Converse, Niobrara, north Carbon, Laramie Valley, Laramie Mountains, Platte, Goshen, Cheyenne Foothills, Pine Bluffs	Albany, Carbon, Converse, Goshen, Laramie, and Platte	4/21/2001	4/22/2001			100,000		The second major winter storm in 10 days produced heavy snow over much of southeast Wyoming, with blizzard conditions in some spots. Twelve to 16 inches recorded in Wheatland and Cheyenne. All roads out of Cheyenne, were closed again, as was much of I-80. Power outages were also reported in parts of Laramie County as winds gusted to around 40 mph.
Niobrara, north Carbon, Snowy Range, north Laramie Mountains, Laramie Valley, Laramie Mountains, Platte, Goshen, Cheyenne Foothills, Pine Bluffs	Albany, Carbon, Goshen, Laramie, and Platte	2/7/2002	2/9/2002					A strong winter storm brought high winds and snow to much of southeast Wyoming, producing blizzard-like conditions in many areas. Snowfall amounts were generally from 1 to 4 inches, but winds gusted more than 50 mph in many areas, creating widespread blowing and drifting snow. Gusts as high as 74 mph were recorded at Warren AFB on the west side of Cheyenne, Wyoming, with gusts to 73 mph near Arlington. I-80 was closed from Rawlins to the Nebraska border along with other roads over eastern Wyoming. Scattered power outages occurred in Cheyenne, Wyoming.

Location	County	Start Date	End Date	Deaths	Injured	Estimated Damage - Property	Estimated Damage - Crops	Information
Cheyenne Foothills - Pine Bluffs	Laramie	11/27/2004	11/28/2004					Heavy snow fell over much of Laramie County with Cheyenne, WY, reporting 10 to 11 inches of snowfall. Gusty winds resulted in some drifting snow resulting in some road closures.

Table 4.53 Severe Winter Storms and Blizzards in Laramie County (NCDC): 2006-2012

Date	Location	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)	Event Description
12/20/06	Pine Bluffs	0	1	0	0	A slow moving winter storm produced blizzard conditions over much of southeastern Wyoming, producing whiteout conditions, drifts up to 5 feet, and closing most roads. One person died during the storm while attempting to find aid after becoming stranded in their vehicle.
12/29/06	Pine Bluffs	0	0	0	0	The second snowstorm in about a week affected southeast Wyoming, with the heaviest snow over the extreme southeastern part.
3/22/09	Pine Bluffs	0	0	0	0	
3/26/09	Pine Bluffs	0	0	0	0	
4/4/09	Pine Bluffs	0	0	0	0	A powerful low pressure system tracked across eastern Colorado and Nebraska and produced strong winds and snow across southeast Wyoming. Blizzard conditions occurred over some areas with many roads closed due to blowing and drifting snow and extremely low visibilities along with numerous accidents.
10/9/09	Central Laramie County, East Laramie County	0	0	0	0	An unusually strong early season cold front brought snow to extreme southeast Wyoming and the southern Nebraska panhandle. Interstate 80 was closed between Cheyenne and Rawlins from the night of October 9 until midday on October 10. Interstate 25 south of Cheyenne was closed for periods as well as several county roads. Law enforcement agencies reported many car accidents.

Date	Location	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)	Event Description
10/27/09	Central Laramie County, East Laramie County	0	0	0	0	A strong Pacific storm brought cold air and abundant moisture to the area. A long duration upslope flow created favorable conditions for heavy snow. This storm produced dangerous winter storm conditions over a wide area of southeast Wyoming and western Nebraska. Interstates 80 and 25, as well as many state and local highways, were closed for significant periods of time causing problems for travelers and commerce. Reports of over 100 accidents were reported. One fatality was reported. There were many reports of snowfall in excess of 20 inches. As the snowfall was winding down, strong northerly winds were observed creating additional issues with blowing and drifting snow. Reports came in of drifts in the 4 to 6 feet range.
12/25/2009	Central Laramie County, East Laramie County	0	0	0	0	
2/20/2010	East Laramie County	0	0	0	0	A slow moving storm system moved across the Central Rockies. At the same time the influence of the mountainous terrain on the easterly surface winds provided additional support for snow to form. The addition of the terrain forcing caused the widespread snowfall to be heavy at times. Many of the reported snowfall amounts ranged from 1.0 to 4.0 inches. However some reports were as high as 5.0 to 6.0 inches, with the highest reported amount of 7.5 inches.

Date	Location	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)	Event Description
3/4/2010	Central Laramie County	0	0	0	0	A strong upper level storm system moved across the central Rockies. Despite the high temperatures from the previous four days being in the 40s and 50s, snow showers with embedded convection created isolated areas of high snowfall amounts across Southeast Wyoming. Snowfall amounts ranged from 1 to 9 inches, with most of the highest snowfall amounts located in the vicinity of Cheyenne and Laramie. However most snowfall reports from around the area were in the 1 to 3 inch range.
4/22/2010	Central Laramie County	0	0	0	0	A slow moving winter storm system progressed eastward through the area. Due to the rather warm conditions ahead of the system, the precipitation changed from rain to snow. Heavy rainfall on the already saturated ground from the plentiful seasonal snowfall and slow moving storms caused localized flooding for parts of the area. High winds also accompanied the rain and snow. The combination of high winds and heavy snow caused locations in and near Bosler, Laramie, and Chugwater, in southern Platte and central Albany counties, to lose power, the only life lose from this storm was 14 calves.
5/11/2010	Central Laramie County, East Laramie County	0	0	0	0	During the evening of the 11 th widespread rainfall developed across the area. As cold air was brought into the region by a strong upper level storm system, the temperature fell below the freezing point causing the rain to change over to snow. Due to the abundant moisture present, widespread heavy snowfall developed across the area during the early morning hours of the 12 th . Interstate 80 and Happy Jack Road were closed for a few hours during the early morning of the 12 th due to blowing snow.

Date	Location	Injuries	Fatalities	Estimated Property Damage (\$)	Estimated Crop Damage (\$)	Event Description
11/11/2010	East Laramie County	0	0	0	0	A strong low pressure system tracked across southern Colorado the morning of November 11, 2010. Wrap around moisture to the north of this low pressure system brought heavy snow to southeast Laramie County.
12/29/2010	Central Laramie County, East Laramie County	0	0	0	0	
2/24/2011	Central Laramie County	0	0	0	0	A cold front and moist southwest flow aloft brought some heavy snow to portions of the region.
10/25/2011	Central Laramie County, East Laramie County	0	0	0	0	A strong, fast-moving Pacific storm system and cold front moved across the central Rockies and combined with moist upslope flow, generating significant snowfall over much of southeast Wyoming.
11/1/2011	Central Laramie County, East Laramie County	0	0	0	0	
2/3/2012	Central Laramie County	0	0	0	0	A potent upper level storm system which moved across Colorado and Kansas produced heavy snow and gusty north to northeast winds over portions of southeast Wyoming. Storm total snowfall ranged from 6 to 12 inches over the central and southern Laramie Range/Foothills and Snowy Range. The combination of falling and blowing snow caused very hazardous travel conditions.
TOTAL		0	1	0	0	

Source: National Weather Service

Table 4.54 Severe Winter Storms and Blizzards in Laramie County (SHELDUS): 1960-2010

Date	Injuries	Deaths	Estimated Property Damage (\$)	Estimated Crop Damage (\$)
11/27/1960	0.63	0	62	0
12/4/1960	0.13	0	0	0
3/20/1961	0.38	0	62	0
5/13/1961	0	0	6,250	0
10/28/1961	0.17	0.22	217	0
5/8/1965	0	0	3,846	0
4/29/1967	0	0	5,555	0
5/12/1967	0	0	10,000	0
4/2/1968	0	0.23	3,846	0
10/27/1971	0	0	5,000	0
3/13/1973	0	0	2,173	0
3/27/1975	0	0	2,1739	0
12/31/1975	0	0	2,173	0
3/10/1977	0	0	12,500	0
11/16/1977	0	0	2,173	0
11/9/1978	0	0	217	0
12/5/1978	0	0	2,173	0
1/1/1979	0	0	21,739	0
2/1/1979	0	0	21,739	0
11/19/1979	0	0	12,500	0
1/18/1980	0.5	0	0	0
10/8/1982	0	0	6,250	0
11/11/1982	0.67	0	5	0
12/1/1982	0	0.08	0	0
3/5/1983	0	0	38	0
3/25/1983	0	0	50	0
4/20/1984	0	0	83	83
9/27/1985	0	0	0	250,000
3/10/1988	0.56	0	5,555	555
10/21/1995	0	0	5,000	0
1/30/1996	0	0	5,000	0
4/4/1997	0	0	714,285	0
10/12/1997	10	0	8,333	0
10/24/1997	0	0	14,285	1,428
12/8/1997	18	0.5	50,000	0
2/15/1998	0	0	10,500	0
10/4/1998	0	0	56,250	0

Date	Injuries	Deaths	Estimated Property Damage (\$)	Estimated Crop Damage (\$)
12/9/1998	1	0	30,000	0
12/26/1998	1	1	12,000	0
3/5/1999	3	1	25,000	0
9/22/2000	0	0	16,666	0
4/10/2001	0	0	175,000	0
4/21/2001	0	0	16,666	0
3/17/2003	0	0	16,666	0
TOTALS	36.04	3.03	1,301,596	252,066

According to SHELDUS, Laramie County experienced 44 notable winter weather events (excluding extreme cold, which has its own profile in this plan) between 1960 and 2010.

Frequency/Likelihood of Occurrence

Winter storms are a yearly feature in Wyoming, often occurring multiple times each winter, and thus are considered a seasonal feature. When an event is seasonal and an anticipated element in a given climate, it is important to also examine the probability of future severe occurrences of the hazard. Given 44 notable severe winter weather events over a 50 year span of time (2010-1960 = 50), there is an 88% chance that a damaging severe winter storm will occur in Laramie County in any given year. Mathematically, this is expressed as:

$$\frac{44}{50} \times 100 = 88\%$$

The SHELDUS records do not capture all of the events listed in Table 4.52 or Table 4.53, so this probability may actually be higher than 88%. The HMPC and NWS estimate that winter storms have a **highly likely** chance of occurring in any given year.

Potential Magnitude

The damages caused by severe winter storms and blizzards vary and are dependent on several factors: the duration of the storm; the geographic extent; the time of year; meteorological factors such as wind, moisture content of the snow, ground and air temperatures; and the advance warning of the storm. Impacts from the storm dictate the magnitude of the event, emphasizing that the amount snow may not always directly correlate to how bad the storm is. Damaged power lines and dangerous or impassable roadways may forestall the delivery of critical services such as medical and emergency assistance, the delivery of food supplies and medications, or even the provision of basic utilities such as heat and running water. When events happen with a long warning time, it is possible to pre-mitigate the effects of insufficient supply levels or to pre-test emergency generators, which may prevent some of the previously described impacts from

occurring. Unanticipated storms increase the number of people stranded, both in cars and at public locations, which may increase the number of injuries and deaths attributed to the event (often caused by exposure) and place uneven and unanticipated strains on public sheltering capacities. The weight of the snow, driven by the water content of the fall, increases the potential for damages caused to structures and trees. Lighter snow caused by extreme cold increases the damages caused to livestock, agriculture and landscaping due to freezing conditions. Winter storms which go through periods of thaw and freeze prolong dangerous icy conditions, increasing the likelihood of frozen and damaged water pipes, impassable or dangerous roadways, damaged communication lines, or more extensive damages to infrastructure and structures caused by seeping water freezing under roofs, porches, patios, inside sidings, or causing damage to vehicles.

Winter storms usually cover a significant part of the State, and as such are difficult to describe regionally. In order to calculate a magnitude and severity rating for comparison with other hazards, and to assist in assessing the overall impact of the hazard on the planning area, information from the event of record is used. In some cases, the event of record represents an anticipated worst-case scenario, and in others, it is a reflection of common occurrence. The most damaging event that included Laramie County occurred on January 2, 1949 and inflicted \$9,000,000 in damages statewide in 1949 dollars, according to Wyoming Office of Homeland Security estimates. SHEL DUS records do not go back to 1949, so it is difficult to tell how much damage Laramie County specifically sustained from that event. The 1949 event shared features with several other severe winter storms. Common damages included loss of crops, loss of livestock, impassable roads, high winds, snow drifts, stranded motorists, downed utility lines, extended power outages, and burst water pipes. Laramie County could expect similar impacts from future severe winter storms.

The HMPC estimated the potential magnitude of severe winter storms to be **critical** – multiple severe injuries may occur, critical facilities could be shut down for at least two weeks, and more than 25% of property in the planning area could be severely damaged.

Vulnerability Assessment

Population

The threat to public safety is typically the greatest concern during severe winter storms. While virtually all aspects of the population are vulnerable to severe winter weather, there are segments of the population that are more vulnerable to the potential indirect impacts of a severe winter storm than others, particularly the loss of electrical power. As a group, the elderly or disabled, especially those with home health care services that rely heavily on an uninterrupted source of electricity. Resident populations in nursing homes or other special needs housing may also be vulnerable if electrical outages are prolonged. If they do not have a back-up power source, rural residents and agricultural operations reliant on electricity for heating and water supplies are also especially vulnerable to power outages.

Severe winter weather also increases the vulnerability of the commuting population. While there is no way to quantify which of these accidents occur during severe winter storms versus regular winter storms, the numbers indicate that winter driving conditions raise the vulnerability of the commuting population.

General Property

Property vulnerabilities to severe weather include damage caused by high winds, ice, or snow pack and subsequently melting snow. Vehicles may be damaged by the same factors, or temporarily un-useable due to the driving conditions created by severe winter weather. Contents of homes, storage units, warehouses, and storefronts may be damaged if the structures are compromised or fail due to the weather, or during potential flooding caused by melting snow. Very wet snow packs down densely and is very heavy. This may create strains on structures, causing partial or entire collapses of walls, roofs, or windows. This is impacted both by architecture and construction material, and should be assessed on a building-by-building basis. These records are probably tracked via insurance or other private vendors. Crops, livestock, and other agricultural operations are also highly vulnerable to severe winter storms. However, an analysis of SHELDUS data suggests that severe winter storms inflicted more property damage than crop damage in Laramie County. The event of record can be used to gauge potential property vulnerability. The most damaging event of record for Laramie County occurred on January 2, 1949 and inflicted \$9,000,000 in damages in 1949 dollars, according to Wyoming Office of Homeland Security estimates.

Essential Infrastructure, Facilities, and Other Important Community Assets

The physical structures which comprise essential infrastructure are as vulnerable as those outlined in the General Property subsection of this profile. Severe winter weather may also disrupt the availability of services from essential infrastructure, including utility delivery (gas, electric and water), telephone service, emergency response personnel capabilities, road plowing, and childcare availability. Severe winter storms may even halt the operation of the county for periods of time, making the vulnerability of the entire County even higher.

As mentioned previously, ice or heavy accumulations of snow, particularly with blowing and drifting, can temporarily impact the roadway system. These accumulations also require vast amounts of overtime for County and local highway and streets departments to remove snow and melt ice. Ice storms or high winds in winter storms can cause extensive loss of overhead utility lines due to buildup either on the lines or on adjacent trees that either collapse due to the weight or blow down onto the utility lines. Services such as telephone, electricity, and cable TV are frequently affected by winter storms. The overall vulnerability of essential infrastructure is medium.

Natural, Historic and Cultural Resources

Natural resources may be damaged by the severe winter weather, including broken trees and death of unsheltered wildlife. Unseasonable storms may damage or kill plant and wildlife, which may impact natural food chains until the next growing season. Historical areas may be more vulnerable to severe winter storms due to construction and age of structures. Cultural resources generally experience the same vulnerabilities outlined in *General Property*, in addition to lost revenue impacts due to transportation impacts. The overall vulnerability of these resources is medium.

Summary

Overall, severe winter storms are a **high** hazard to Laramie County.

PROPERTY AFFECTED: High

POPULATION AFFECTED: High

PROBABILITY: Highly Likely

JURISDICTION AFFECTED: County, City of Cheyenne, Town of Albin, Town of Burns, Town of Pine Bluffs

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5 MITIGATION STRATEGY

Requirement §201.6(c)(3): [The plan shall include] a mitigation strategy that provides the jurisdiction’s blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

This section describes the mitigation strategy process and mitigation action plan for the Combined Laramie County Mitigation and Strategy Plan update. It explains how the participating jurisdictions accomplished Phase 3 of FEMA’s 4-phase guidance—Develop the Mitigation Plan—and includes the following from the 10-step planning process:

- Planning Step 6: Set Goals
- Planning Step 7: Review Possible Activities
- Planning Step 8: Draft an Action Plan

Up to this point in the planning process, the Hazard Mitigation Planning Committee (HMPC) has organized resources, assessed natural hazards and risks, and documented mitigation capabilities. A profile of the County’s vulnerability to natural hazards resulted from this effort, which is documented in the preceding chapter. The resulting goals, objectives, and mitigation actions were developed based on this profile. The HMPC developed this section of the plan based on a series of meetings and worksheets designed to achieve a collaborative mitigation planning effort. This section also builds upon the mitigation strategies developed in the original 2005 City and County plans, and provides an update to the actions previously identified in that plan.

“Mitigation,” as defined by FEMA, is any sustained action taken to reduce or eliminate long-term risk to human life and property from hazards. FEMA’s definition includes actions that protect both existing and future development. An important distinction to note is that many of the County and municipalities’ land use planning documents use the term mitigation to refer to protection of existing development only. The broader FEMA definition will be used for the purposes of this hazard mitigation plan.

5.1 Goals

Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

The goals for this plan were updated by the HMPC through a process facilitated by the consultant project manager during a meeting on the combined plan’s updated risk assessment. This analysis of the risk assessment identified areas where improvements could be made and provided the framework for the HMPC to revisit planning goals and objectives and the mitigation strategy for Laramie County and the City of Cheyenne.

Goals were defined for the purpose of this mitigation plan as broad-based public policy statements that:

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- Represent basic desires of the community;
 - Encompass all aspects of community, public and private;
 - Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
 - Are future-oriented, in that they are achievable in the future; and
 - Are time-independent, in that they are not scheduled events.

Goals are stated without regard for implementation, that is, implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that the goals are not dependent on the means of achievement. Goal statements form the basis for objectives and actions that will be used as means to achieve the goals. Objectives define strategies to attain the goals and are more specific and measurable.

HMPC members were given a worksheet for formulating and updating the mitigation strategy at the end of the risk assessment meeting. This worksheet included a list of sample goals to consider, including the original goals of the 2005 Laramie County Multi-Hazard Mitigation Plan, the 2005 City of Cheyenne Multi-Hazard Mitigation Plan, and the 2011 Wyoming Multi-Hazard Mitigation Plan. The HMPC was instructed to indicate two to three of the most important goals and to mark up and revise the existing goals as necessary. They could use, combine, or revise the goal statements provided or develop new ones on their own, keeping the risk assessment in mind. The results were collected and combined and through this process a revised set of goals and objectives emerged. HMPC members decided to merge the original three County goals and eight City goals into three, with some of the previous plan's goals becoming more specific objectives. The finalized updated goals represented the HMPC's input and consensus and are listed below.

Goal 1: Improve protection of the general population, including the citizens and guests of Laramie County, the City of Cheyenne, the Town of Albin, the Town of Burns, and the Town of Pine Bluffs, from hazards.

- Continue to improve emergency preparedness.
- Continue to improve Laramie County and the City of Cheyenne's disaster response and recovery capabilities.
- Educate residents, business/industry representatives, and government officials on the hazards and risks in their area to allow them to make informed decisions as to what level of feasible and realistic disaster resistance they desire for themselves and their communities.

Goal 2: Reduce the potential impact of hazards on critical support services, critical facilities, infrastructure, private property, and economy in Laramie County, the City of Cheyenne, the Town of Albin, the Town of Burns, and the Town of Pine Bluffs.

- Reduce impacts to existing and future development.

-
- Strengthen and improve disaster resistance of facilities owned and operated by Laramie County and the City of Cheyenne to prevent injury and loss of life, and to reduce potential property damage.
 - Strengthen infrastructure and lifelines, including: gas and electrical transmission and distribution lines, communication lines, water distribution systems, roads, and bridges as a means of preventing loss of life, reducing damages, and reducing loss of revenue.
 - Strengthen infrastructure and reduce damages to road crossings, reduce potential for loss of life, and increase public safety in the City of Cheyenne's special flood hazard areas (SFHA).
 - Minimize disruption of critical services.

Goal 3: Enhance cooperation and coordination between governmental authorities at all levels and private sector partners in regards to hazard mitigation.

- Implement lessons learned from other communities.
- Raise awareness and acceptance of hazards and mitigation programs.
- Identify potential cost sharing opportunities to fund mitigation projects.

5.2 Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

In order to identify and select mitigation measures to support the mitigation goals, each hazard identified in Section 4.1: Identifying Hazards was evaluated. The HMPC analyzed a comprehensive set of viable mitigation alternatives during both the original plan and 2012 update that would support identified goals and objectives. In 2005, the City and County action plans were developed by analyzing existing city and county programs and proposed improvements or changes to those programs. Additional programs were also identified as potential mitigation strategies.

During the 2012 mitigation strategy meeting, each HMPC member was provided with the following list of categories of mitigation measures, which originate from the NFIP Community Rating System.

- Prevention
- Property Protection
- Structural Projects
- Natural Resource Protection
- Emergency Services
- Public Information

The HMPC members were provided with several lists of alternative multi-hazard mitigation actions for each of the above categories. HMPC members were encouraged to develop mitigation alternatives that would protect future, as well as existing development from hazards per the DMA 2000 regulations. A facilitated discussion then took place to examine and analyze the alternatives. With an understanding of the alternatives, a brainstorming session was conducted to generate a list of preferred mitigation actions. HMPC members wrote project ideas on large sticky notes. These were posted on flip charts labeled with the hazards. The result was a number of new project ideas with the intent of mitigating the identified hazards.

5.2.1 Prioritization Process

Once the mitigation actions were identified, the HMPC members were provided with several sets of decision-making tools, including FEMA's recommended criteria, STAPLE/E (which considers social, technical, administrative, political, legal, economic, and environmental constraints and benefits). The STAPLE/E method proposes the following questions to guide prioritization:

- Social: Does the measure treat people fairly?
- Technical: Will it work? (Does it solve the problem? Is it feasible?)
- Administrative: Is there capacity to implement and manage the project?
- Political: Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support it?
- Legal: Does your organization have the authority to implement the measure? Is it legal? Are there liability implications?
- Economic: Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development? Does it reduce direct property losses or indirect economic losses?
- Environmental: Does it comply with environmental regulations or have adverse environmental impacts?

In 2005, the Laramie County mitigation planning team developed eight mitigation actions to address the three goals of the plan. The planning team prioritized the actions with emphasis on maximizing benefits relative to costs.

The HMPC prioritized both new mitigation actions and strategies carried over from the 2005 plans during the 2012 update process. In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining project priority (the 'economic' factor of STAPLE/E). Other criteria used to recommend what actions might be more important, more effective, or more likely to be implemented than others included:

- Does the action protect lives?
- Does the action address hazards or areas with the highest risk?
- Does the action protect critical facilities, infrastructure or community assets?
- Does the action meet multiple objectives (Multiple Objective Management)?

HMPC members were then given a set of four orange sticky-dots. The HMPC was asked to use the dots to prioritize projects with the above criteria in mind, essentially voting on the projects. The projects with the most dots became the higher priority projects. This process provided both consensus and priority for the recommendations.

The results of the project identification and prioritization exercise are summarized in Table 5.1 and detailed in Appendix A. These projects detail specific actions for reducing future hazard-related losses within Laramie County and the participating jurisdictions. The projects are organized by jurisdiction and hazards that the projects intend to mitigate. Included are the affected jurisdiction(s) and notes about the department and partners necessary to implement the project. Also included are the goal(s) that the projects primarily align with, with an understanding that some projects may help to achieve more than one goal. The mitigation projects are marked with their relative level of priority: H=high, M=medium, and L=low.

5.3 Mitigation Action Plan

Requirement §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

This section outlines the development of the updated mitigation action plan. The action plan consists of the specific projects, or actions, designed to meet the plan's goals. Over time the implementation of these projects will be tracked as a measure of demonstrated progress on meeting the plan's goals.

5.3.1 Progress on Previous Mitigation Actions

During the 2012 update process the HMPC reviewed and evaluated the 2005 mitigation strategies to determine the status of the actions. The purpose of this was to measure progress by determining which actions were completed, and to revisit the remaining items to determine if they should be carried forward or removed from the plan. The 2005 Laramie County mitigation strategy contained eight separate mitigation actions benefiting one or more communities within Laramie County. Of these actions, three were completed and five are ongoing. Several of these actions have increased the response capabilities of the County, and thus will help save lives in future incidents. These include the development of an emergency communications system, development of an outdoor warning system, and adoption of mutual aid agreements. Other projects related to multiple hazards and flood mitigation have been ongoing and will continue to be priority projects in the future.

The 2005 City of Cheyenne Multi-Hazard Mitigation Plan contained 106 separate actions. Several actions were combined during the 2012 update process to make the mitigation action

plan more manageable, and the original list of 106 projects was condensed into 35 projects. Many of the 106 projects were essentially the same but were broken out by individual hazards. For the 2012 plan update these projects were condensed into a single multi-hazard project. A few of the 35 projects were further combined into County projects of the same nature (e.g. all-hazards public education instead of public outreach projects for each hazard).

The 2005 City of Cheyenne HMP also listed 116 flood mitigation sub-projects. The sub-projects included specific structural and non-structural mitigation recommendations for each of the drainage basins in Cheyenne. Many of these projects were originally identified in the 1988 Cheyenne Master Drainage Plan and have been revised over the years in the 2000 Surface Water Drainage Committee Report on Implementing the Drainage Master Plan for the Greater Cheyenne Area, the 2005 Cheyenne Flood Mitigation Plan and 2005 Cheyenne HMP. Thirty-four sub-projects had been listed in the 2005 Cheyenne HMP as completed or potentially unnecessary pending completion of other mitigation activities. The HMPC identified which of these projects could be deleted or listed as completed in the 2012 plan update. These 34 sub-projects are listed in Table 5.1.

Nine different drainage basin sub-projects previously identified in the City’s Drainage Master Plan had been deleted from the 2005 City of Cheyenne HMP under the assumption that other projects would render them unnecessary. During the 2012 update process the HMPC determined that the deleted sub-projects were still needed, and the nine projects were added back into the 2012 mitigation action plan. The estimated cost to complete the nine sub-projects was added to the estimated cost for each overarching basin project. These nine sub-projects are listed in the tables for the associated drainage basins in Appendix A.2.

Because many of these projects are implemented on an annual or otherwise continuous basis and some of the projects have yet to be funded or have otherwise not been initiated, five projects from the 2005 Laramie County Plan have been identified for continuation in this plan update. Table 5.1 indicates those actions that have been completed, partially completed, or deleted. Actions from 2005 that are either ongoing or remain to be completed and being carried forward in this plan are integrated into Table 5.2 and marked with a triple asterisk (***) in the action description column.

Table 5.1. Completed and Deleted Mitigation Actions from 2005 Plans

Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Status	Comments
Multiple	Communications System	Countywide/Emergency Services	Partially Completed	Continued action in 2012
Multiple	Outdoor Warning Systems	Countywide/Emergency Management	Partially Completed	Continued action in 2012
Multiple	Adoption of Mutual Aid Agreements	Countywide and City of Cheyenne/Emergency Services	Completed	
Flood – Capitol	78" reinforced concrete pipe	City of Cheyenne/City	Completed	

Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Status	Comments
Basin	at 7 th -8 th Ave.	of Cheyenne Engineering Office		
Flood – Capitol Basin	25 acre foot detention pond/park at Central Park	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Capitol Basin	Analysis and evaluation of Capitol Storm Drain System	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood - Clear Creek Basin	Remove radio station building	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Crow Creek Basin	Bridge Replacement at Warren Ave.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	Part of Crow Creek FEMA PDM project
Flood – Crow Creek Basin	Floodwalls Upstream from Morrie Ave.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	Part of Crow Creek FEMA PDM project
Flood – Crow Creek Basin	Bridge Replacement at Morrie Ave.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	Part of Crow Creek FEMA PDM project
Flood – Crow Creek Basin	Additional culverts at Demming Dr.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	1 st St. bridge completed by WYDOT
Flood – Dry Creek Basin	Dry Creek Re-alignment CORPS Sec. 205 Project	City of Cheyenne/City of Cheyenne Engineering Office	Completed	Proposed re-alignment of Dry Creek east of Converse Avenue to provide significant additional detention
Flood – Dry Creek Basin	Trail and Channel Maintenance from Ridge Road to N. College Dr.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Dry Creek Basin	Larger culverts at Yellowstone Rd.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Dry Creek Basin	Trail and channel maintenance from Powderhouse Rd. to Mountain Rd.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Dry Creek Basin	Converse Ave. improvements	City of Cheyenne/City of Cheyenne Engineering Office	Completed	Converse Ave. crossing of Dry Creek built to 100- year flood standard
Flood – Dry Creek Basin	Trail and channel maintenance from N. College Dr. to US Hwy 30	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Dry Creek Basin	Replace culverts at Rawlins St.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Dry Creek Basin	Build floodwall from Rawlins St. to US Hwy 30	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Dry Creek Basin	Remove crossing at Charles St.	City of Cheyenne/City of Cheyenne	Completed	

Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Status	Comments
		Engineering Office		
Flood – Dry Creek Basin	Broaden channel downstream from US Hwy 30	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Dry Creek Basin	Build floodwall from Pershing Blvd. to Charles St.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Dry Creek Basin	Replace culverts at Pershing Blvd.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Dry Creek Basin	Raise roadway at Pershing Blvd.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Henderson and E. Lincolnway Basin	Headwall and plunge pond at E. Lincolnway	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Henderson and E. Lincolnway Basin	Channel improvements from E. Lincolnway to Nationway	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Henderson and E. Lincolnway Basin	Channel improvements at Nationway	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Henderson and E. Lincolnway Basin	New culverts at Nationway	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Henderson and E. Lincolnway Basin	Channel improvements from Nationway to Belaire Dr.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Henderson and E. Lincolnway Basin	New culverts at Belaire Dr.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Henderson and E. Lincolnway Basin	Channel improvements downstream of Belaire Dr.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Henderson and E. Lincolnway Basin	New culverts at Henderson Dr.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Henderson and E. Lincolnway Basin	Channel improvements from Henderson Dr. to N. College Dr.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Henderson and E. Lincolnway Basin	New culverts at Holmes St.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	

Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Status	Comments
Flood – Henderson and E. Lincolnway Basin	VA Detention Pond	City of Cheyenne/City of Cheyenne Engineering Office	Completed	
Flood – Henderson and E. Lincolnway Basin	Diversion of Headwaters to Dry Creek	City of Cheyenne/City of Cheyenne Engineering Office	Completed	Proposed Diversion of Headwaters to Dry Creek with Dry Creek Re-alignment Project
Flood-Holliday Basin	Detention pond at Morrie Ave.	City of Cheyenne/City of Cheyenne Engineering Office	Completed	Airport Parkway Ponds
Flood – Dry Creek Basin	Trail and channel maintenance from Yellowstone Rd. to Dell Range Blvd.	City of Cheyenne/City of Cheyenne Engineering Office	Partially completed	
Flood – Henderson and E. Lincolnway Basin	Channel improvements from Holmes St. to E. Lincolnway	City of Cheyenne/City of Cheyenne Engineering Office	Partially completed	
Flood – Capitol Basin	Storm drain in Downtown Cheyenne	City of Cheyenne/City of Cheyenne Engineering Office	Deleted	Relocated to 18 th St. major interceptor
Flood – Dry Creek Basin	Emergency spillway at North Fork	City of Cheyenne/City of Cheyenne Engineering Office	Deleted	Deemed not necessary; spillway flow is minimal compared with storm drainage from Western Hills subdivision
Flood – Dry Creek Basin	Larger culverts at Gateway Dr.	City of Cheyenne/City of Cheyenne Engineering Office	Deleted	Deemed not necessary due to increased upstream storage
Flood – Dry Creek Basin	Additional culverts at Dell Range Blvd.	City of Cheyenne/City of Cheyenne Engineering Office	Deleted	Not necessary with re-alignment of Dry Creek
Flood – Dry Creek Basin	Channel improvements from Dell Range Blvd. to Ridge Rd.	City of Cheyenne/City of Cheyenne Engineering Office	Deleted	Not necessary with re-alignment of Dry Creek
Flood – Dry Creek Basin	Larger culverts at Windmill Rd.	City of Cheyenne/City of Cheyenne Engineering Office	Deleted	Not necessary with re-alignment of Dry Creek
Flood – Dry Creek Basin	Additional culverts at Ridge Rd.	City of Cheyenne/City of Cheyenne Engineering Office	Deleted	Not necessary with re-alignment of Dry Creek
Flood – Dry Creek Basin	Broaden channel from Ridge Rd. to N. College Dr.	City of Cheyenne/City of Cheyenne Engineering Office	Deleted	Not necessary with re-alignment of Dry Creek
Flood – Dry Creek Basin	Additional culverts at N. College Dr.	City of Cheyenne/City of Cheyenne Engineering Office	Deleted	Not necessary with re-alignment of Dry Creek
Flood – Dry Creek Basin	Build floodwall from Pershing Blvd. to Union Pacific Railroad	City of Cheyenne/City of Cheyenne Engineering Office	Deleted	Not necessary with re-alignment of Dry Creek
Flood – Henderson and	New culverts at E. Lincolnway	City of Cheyenne/City of Cheyenne	Deleted	Deleted due to additional detention with Wills Rd.

Hazard(s)	Action Description	Jurisdiction/ Responsible Party	Status	Comments
E. Lincolnway Basin		Engineering Office		pond
Flood – Henderson and E. Lincolnway Basin	Channel improvements from E. Lincolnway to 12 th St.	City of Cheyenne/City of Cheyenne Engineering Office	Deleted	Deleted due to additional detention with Wills Rd. pond

5.3.2 Continued Compliance with NFIP

Given the flood hazard in the planning area and the importance of the NFIP in mitigating flood losses, and the degree of flood risk in the County, an emphasis will be placed on continued compliance with the NFIP by participating communities (Laramie County, City of Cheyenne, Town of Burns, and Town of Pine Bluffs). As NFIP participants, the County and municipalities have and will continue to make every effort to remain in good standing with NFIP. This includes continuing to comply with the NFIP’s standards for updating and adopting floodplain maps and maintaining the floodplain zoning ordinance. There are several action items identified in Table 5.2 that address specifics related to NFIP continued compliance. Other details related to NFIP participation are discussed in the community capabilities in Chapter 2 of this plan and the flood vulnerability discussion in Section 4.4.

5.3.3 Updated Mitigation Action Plan

A summary of the action items is captured in Table 5.2 including a description of the action, priority, hazards intended to be mitigated, the parties responsible for implementation, and an action identification number to make actions easier to track and reference in the future. For each identified project a worksheet designed to capture additional details was filled out by the HMPC member or organization taking the lead on project implementation. These details include: project intent, hazard(s) mitigated, other alternatives considered, cost, benefits (losses avoided), responsible entity, priority, and potential funding. These project details are captured in Appendix A. Many of these mitigation actions are intended to reduce impacts to existing development. Those that protect future development from hazards, as required per the DMA 2000 regulations, are indicated by a double asterisk ‘**’ in the action description. These actions include those that promote wise development and hazard avoidance, such as building code, mapping and zoning improvements, and continued enforcement of floodplain development regulations. Actions carried forward from the 2005 plans are indicated by a triple asterisk ‘***.’ Progress on those actions can be referenced in the detailed project descriptions in Appendix A.

Table 5.2. Laramie County Mitigation Action Summary Table

Action ID #	Hazard(s)	Action Description	Year Identified	Responsible Party	Related Goal(s)*	Priority
Laramie County						
1	Flood	Countywide Floodplain Management and Regulation**, ***	2005	Laramie County Planning Department	1, 2	High
2	Flood	Future Development Plan for Allison Basin in South Cheyenne**	2012	Laramie County Public Works	1, 2	High
3	Flood	Wetlands Extension	2012	Laramie County Planning Department	1, 2	Medium
4	Hazardous Materials	Oil and Gas Safety Development Plan	2012	Laramie County	1, 2, 3	High
5	Multiple	Emergency Communications Systems***	2005	Laramie County Combined Communications Center	1, 2	High
6	Multiple	Outdoor Warning Systems***	2005	Laramie County Emergency Management	1, 2	High
7	Multiple	Critical Infrastructure Protection: Risk Assessments and Action Plans***	2005	Laramie County Emergency Management	1, 2	High
8	Multiple	All-Hazards Public Education***	2005	Laramie County and All Jurisdictions	1, 2, 3	High
9	Tornadoes	Tornado Shelters	2012	Laramie County Emergency Management	1, 2	High
10	Wildland Fire	Development of Community Wildfire Protection Plans for Fire Districts 2, 8, and 10	2012	Laramie County Fire Warden; Fire Districts	1, 2, 3	High
Town of Albin						
11	Multiple	Installation of Backup Generator at Railroad Well in Albin	2012	Town of Albin Public Works	1, 2	High
12	Multiple	Upgrade Security for Water and Wastewater Infrastructure in Albin	2012	Town of Albin Public Works	1, 2	High
13	Multiple	Installation of Backup Generator at Albin Community Center	2012	Town of Albin Public Works	1, 2	High
14	Multiple	Upgrade Personal Protective Equipment and Other Safety Gear for Albin Emergency Services Personnel	2012	Town of Albin Public Service and Public Works	1, 2	Medium
15	Multiple	Purchase Additional Traffic Control Equipment and	2012	Town of Albin Public Works	1	Low

Action ID #	Hazard(s)	Action Description	Year Identified	Responsible Party	Related Goal(s)*	Priority
		Signage for Emergency Evacuations in Albin				
Town of Burns						
16	Flood	Development of Stormwater Drainage Plan for the Town of Burns	2012	Town of Burns	1, 2	Medium
17	Hazardous Materials	Development of Hazardous Materials Plan for the Town of Burns	2012	Town of Burns	1, 2	Medium
18	Multiple	Purchase Emergency Power Automatic Generators for Burns-Plex	2012	Town of Burns Mayor/Council	1, 2	Medium
Town of Pine Bluffs						
19	Flood	Southeast Pine Bluffs Drainage Project	2012	Pine Bluffs Department of Public Works	1, 2	High
20	Flood	Clean Up and Expansion of Existing Drainage at Highway 30 North to North Beech St. to Lodge Pole Creek	2012	Pine Bluffs Department of Public Works	1, 2	High
21	Flood	Upsizing Pine Bluffs Downtown Stormwater Drainage	2012	Pine Bluffs Department of Public Works	1, 2	High
22	Flood	Continue to Implement Sound Floodplain Management Practices through Participation in the NFIP in the Town of Pine Bluffs**	2012	Pine Bluffs Public Works/Utilities Department	1, 2, 3	Low
23	Multiple	Purchase Portable Backup Generation for Two Water Wells	2012	Pine Bluffs Waterworks	1, 2	High
24	Multiple	Purchase Portable Backup Generation for Community Center	2012	Town of Pine Bluffs	1, 2	High
25	Multiple	Underground the Pine Bluffs Electrical System	2012	Pine Bluffs Department of Public Works	1, 2	High
26	Multiple	Purchase Traffic Control Equipment and Signage for Emergency Evacuations in Pine Bluffs	2012	Pine Bluffs Department of Public Works	1, 2	Medium
City of Cheyenne						
27	Drought	Development of Belvoir Groundwater Pipeline	2012	Board of Public Utilities	1, 2	Medium
28	Drought	Expansion of Reservoir Storage/Collection Capabilities	2012	Board of Public Utilities	1, 2	Medium
29	Drought	Expansion of Current Recycled Water System	2012	Board of Public Utilities	1, 2	Low
30	Flood	Reduce Flood Damage Potential in Clear Creek	2005	City of Cheyenne Engineering	1, 2	High

Action ID #	Hazard(s)	Action Description	Year Identified	Responsible Party	Related Goal(s)*	Priority
		Basin (includes 11 sub-projects. See Table A.1.)		Department		
31	Flood	Reduce Flood Damage Potential in Crow Creek Basin (includes 21 sub-projects. See Table A.2.)	2005	City of Cheyenne Engineering Department	1, 2	High
32	Flood	Reduce Flood Damage Potential in Dry Creek Basin (includes 22 sub-projects. See Table A.3.)	2005	City of Cheyenne Engineering Department	1, 2	High
33	Flood	Reduce Flood Damage Potential in Henderson and E. Lincolnway Basin (includes 10 sub-projects. See Table A.4.)	2005	City of Cheyenne Engineering Department	1, 2	High
34	Flood	Reduce Flood Damage Potential in Holiday Basin (includes 3 sub-projects. See Table A.5.)	2005	City of Cheyenne Engineering Department	1, 2	High
35	Flood	Reduce Flood Damage Potential in Lower Capitol Basin (includes 2 sub-projects. See Table A.6.)	2005	City of Cheyenne Engineering Department	1, 2	High
36	Flood	Reduce Flood Damage Potential in Upper Capitol Basin (includes 1 sub-project. See Table A.7.)	2005	City of Cheyenne Engineering Department	1, 2	High
37	Flood	Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program in the City of Cheyenne	2012	City of Cheyenne Engineering Department	1, 2	Low
38	Multiple	Adoption of Mutual Aid Agreements/Participation in WYOWARN	2012	Board of Public Utilities	1, 2, 3	Medium
39	Multiple	Development of Hydroelectric Power Generation	2012	Board of Public Utilities	1, 2	Low

*Goal 1: Improve protection of the general population, including the citizens and guests of Laramie County, the City of Cheyenne, the Town of Albin, the Town of Burns, and the Town of Pine Bluffs, from hazards; Goal 2: Reduce the potential impact of hazards on critical support services, critical facilities, infrastructure, private property, and economy in Laramie County, the City of Cheyenne, the Town of Albin, the Town of Burns, and the Town of Pine Bluffs; Goal 3: Enhance cooperation and coordination between governmental authorities at all levels and private sector partners in regards to hazard mitigation.

**Action related to prevention of losses to future development.

***Action carried over from 2005 plans.

6 PLAN ADOPTION

Requirement §201.6(c)(3): [The local hazard mitigation plan shall include] documentation that the plan has been formally approved by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, county commissioner, Tribal Council).

The purpose of formally adopting this plan is to secure buy-in from Laramie County and participating jurisdictions; raise awareness of the plan; and formalize the plan's implementation. The adoption of this plan completes Planning Step 9 of the 10-step planning process: Adopt the Plan. The governing board for each participating jurisdiction has adopted this local hazard mitigation plan by passing a resolution. Copies of the signed resolutions are included in Appendix E Plan Adoption. The plan will need to be re-adopted every five years in accordance with the plan update requirements which are described further in Chapter 7.

7 PLAN IMPLEMENTATION AND MAINTENANCE

Requirement §201.6(c)(4): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This is Planning Step 10 of the 10-step planning process and Phase 4 of FEMA's Four-phase process. This chapter provides an overview of the overall strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

7.1 Implementation

Once updated and adopted this plan is intended to be implemented so that Laramie County and the City of Cheyenne's vulnerability to natural hazards can be reduced over time. While this plan update contains many worthwhile mitigation actions, the HMPC will need to decide which action(s) to undertake first. Two factors will help with making that decision: the priority assigned the actions in the planning process and funding availability. Low or no-cost projects can sometimes most easily demonstrate progress toward successful plan implementation.

Implementation will be accomplished by adhering to the schedules identified for each action (see Appendix A Mitigation Actions) and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits of each project to the Laramie County community and its stakeholders. These efforts include the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community. The three main components of implementation are:

- IMPLEMENT the action plan recommendations of this plan;
- UTILIZE existing rules, regulations, policies and procedures already in existence to prevent problems from becoming worse; and
- COMMUNICATE the hazard information collected and analyzed through this planning process so that local governments and the public better understands what can happen where, and what they can do themselves to be better prepared. Also, publicize the "success stories" that are achieved through the HMPC's ongoing efforts.

Simultaneous to these efforts, the HMPC will constantly monitor funding opportunities that could be leveraged to implement some of the more costly actions. This will include creating and maintaining a bank of ideas on how to meet required local match or participation requirements. When funding does become available, the HMPC will be in a position to capitalize on the

opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, special district budgeted funds, state and federal earmarked funds, and other grant programs, including those that can serve or support multi-objective applications.

7.1.1 Role of Hazard Mitigation Planning Committee in Implementation and Maintenance

With adoption of this plan, the HMPC will be tasked with plan implementation and maintenance. The HMPC will be led by the Laramie County Emergency Management Agency. The HMPC will act as an advisory body. Its primary duties will be to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. The HMPC agrees to:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Report on plan progress and recommended changes to the Laramie Board of County Commissioners and Cheyenne City Council; and
- Inform and solicit input from the public.

Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the Laramie County and City of Cheyenne websites and local newspapers.

7.2 Maintenance

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as required or as progress, roadblocks, or changing circumstances are recognized.

7.2.1 Maintenance Schedule

In order to track progress and update the mitigation strategies identified in the action plan, the HMPC will revisit this plan annually or after a significant hazard event or disaster declaration. The Laramie County Emergency Management Agency is responsible for initiating this review and convening members of the HMPC on a once yearly basis, or more frequently as needed. The annual review is recommended to occur in the month of January.

This plan will be updated, approved and adopted within a five-year cycle as per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000. Efforts to begin the update should begin no later than January 2017. The County will inquire with the Wyoming Office of Homeland Security (WYOHS) and FEMA for funds to assist with the update. Funding sources may include the Emergency Management Performance Grants, Pre- Disaster Mitigation, Hazard Mitigation Grant Program (if a presidential disaster has been declared), and Flood Mitigation Assistance grant funds. Should a Pre- Disaster Mitigation planning grant be sought, the application should be submitted in 2014, as there is a three year performance period to expend the funds, plus there is no guarantee that the grant will be awarded the when initially submitted. This allows time to resubmit the grant in 2015 or 2016 if needed. The next plan update is anticipated to be completed and reapproved by WYOHS and FEMA Region VIII by November 2017.

7.2.2 Maintenance Evaluation Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Such changes in vulnerability may include:

- Decreased vulnerability as a result of implementing recommended actions,
- Increased vulnerability as a result of failed or ineffective mitigation actions, and/or
- Increased vulnerability as a result of new development (and/or annexation).

The HMPC will use the following process to evaluate progress, note changes in vulnerability, and consider changes in priorities as a result of plan implementation:

- A representative from the responsible entity identified in each mitigation measure will be responsible for tracking and reporting on an annual basis to the HMPC on project status. The representative will provide input on whether the project as implemented meets the defined goals objectives and is likely to be successful in reducing vulnerabilities.
- If the project does not meet identified goals and objectives, the HMPC will select alternative projects for implementation.
- New projects identified will require an individual assigned to be responsible for defining the project scope, implementing the project, monitoring success of the project.
- Projects that were not ranked high priority but were identified as potential mitigation strategies will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation.
- Changes will be made to the plan to accommodate for projects that have failed or are not considered feasible after a review for their consistency with established criteria, the time frame, priorities, and/or funding resources.

Updates to this plan will follow the most current FEMA, WYOHS, and CRS-FMA planning guidance and consider the following:

- Consider changes in vulnerability due to project implementation;

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- Document success stories where mitigation efforts have proven effective;
 - Document areas where mitigation actions were not effective;
 - Document any new hazards that may arise or were previously overlooked;
 - Document hazard events and impacts that occurred within the five-year period;
 - Incorporate new data or studies on hazards and risks;
 - Incorporate new capabilities or changes in capabilities;
 - Document continued public involvement;
 - Document changes to the planning process, which may include new or additional stakeholder involvement;
 - Incorporate growth and development-related changes to building inventories, or projected development that could be vulnerable to hazards;
 - Incorporate new project recommendations or changes in project prioritization;
 - Include a public involvement process to receive public comment on the updated plan prior to submitting the updated plan to WYOHS/FEMA; and
 - Include readoption by all participating entities following WYOHS/FEMA approval.

7.2.3 Incorporation into Existing Planning Mechanisms

Another important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other jurisdictional plans and mechanisms. Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. As stated in Section 7.1 of this plan, implementation through existing plans and/or programs is recommended, where possible. This point is re-emphasized here. Based on this plan's capability assessment, the participating jurisdictions have and continue to implement policies and programs to reduce losses to life and property from natural hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing projects, where possible, through these other program mechanisms. These existing mechanisms include:

- 2012 City of Cheyenne Unified Development Code
- 2011 Laramie County Land Use Regulations
- 2011 Wyoming Multi-Hazard Mitigation Plan
- 2006 PlanCheyenne
- 2005 Laramie County Multi-Hazard Mitigation Plan
- 2005 City of Cheyenne Multi-Hazard Mitigation Plan
- 2005 City of Cheyenne Flood Hazard Mitigation Plan
- 2003 Board of Public Utilities Water and Wastewater Master Plan
- 2001 Laramie County Comprehensive Plan
- 2000 Surface Water Drainage Committee Report on Implementing the Drainage Master Plan for the Greater Cheyenne Area

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- 1988 Cheyenne Drainage Master Plan
 - Activities related to CRS participation for the County and City of Cheyenne
 - Laramie County Energy Emergency Response Plan
 - Cheyenne / Laramie County Emergency Response Plan

HMPC members involved in the updates to these mechanisms will be responsible for integrating the findings and recommendations of this plan with these other plans, as appropriate. The mitigation plan can be considered a core document that links to other related planning mechanisms that will build from the information and recommendations contained herein. An example would be using the risk assessment information to update the hazard analysis in the Laramie County Emergency Operations Plan. Another example is using this plan to inform development of a countywide CWPP or individual community CWPPs.

7.2.4 Continued Public Involvement

Continued public involvement is also imperative to the overall success of the plan's implementation. The update process provides an opportunity to publicize success stories from the plan implementation and seek additional public comment. A public hearing(s) to receive public comment on plan maintenance and updating will be held during the update period. When the HMPC reconvenes for the update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. The plan maintenance and update process will include continued public and stakeholder involvement and input through participation in designated committee meetings, LEPC meetings, web postings, and press releases to local media. Public awareness of the plan and individual flood mitigation strategies could be developed on an annual basis during public outreach each spring before the runoff begins. This can also occur in coordination with the County and City of Cheyenne CRS public notification activities.

APPENDIX A MITIGATION ACTIONS

The following appendix provides project specifics and implementation details for mitigation actions identified. They are grouped by the type of hazard(s) they address (see Section 5.3 Mitigation Action Plan for summary).

Laramie County Mitigation Actions

1. Countywide Floodplain Management and Regulation

Hazards Addressed Flood

Project Description and Background Current floodplain regulations are general in nature and are requiring more specific needs to address compounded impacts of multiple developments upstream of problem drainages. As development occurs further out along previously identified drainages the current required strategies no longer address the issues as multiple developments are built downstream. The current plans need to be reviewed and revised to address future development.

Progress to Date Additionally, specific drainages do not have detailed flood elevations. Detailed flood studies are needed in these areas. Laramie County and the City of Cheyenne began implementing flood mitigation projects immediately following the devastating 1985 flood. Dry Creek has seen the most drastic improvements. In 1985 the most loss of life and damage occurred along this channel. A mitigation plan was developed to both clean and widen the channel through town to handle future flash flood problems. As the Cheyenne area grows along the Dry Creek watershed the channel is cleaned and widened to support potential floodwaters.

Crow Creek saw flooding due to debris flows and channel narrowing. Flooding was not as significant in this area because of storm location. The Crow Creek drainage continues to be vulnerable to damage if a severe storm should occur over western Laramie County.

The City and County are also working on projects in Allison Draw.

Other Alternatives None identified

Jurisdiction Laramie County

Responsible Office Laramie County Planning

Priority High

Cost Estimate \$500,000

Benefits Better mitigation efforts and planning regulations prior to developments being placed in higher risk or areas developed in or near identified basins. Better information will assist on overall assessment of development in and near floodplains. Identification of areas where flood hazard mitigation can be implemented. Reduces flood insurance premiums based on participation in CRS.

Potential Funding State Loan and Investment Board (SLIB), FEMA

Schedule Five years

2. Future Development Plan for Allison Basin, South Cheyenne

Hazards Addressed Flood

Project Description and Background Allison Draw / Basin is a floodplain management project supported by prior FEMA mitigation funds completed in several phases on the southern edge of Cheyenne. The draw is now entering its next phase as more growth occurs in this area. As these undeveloped areas in Allison Basin grow both detention and retention facilities must be identified, planned and mapped to prevent and reduce downstream flooding or overtopping of the draw. Included in this planning phase is identification of neighborhood drainage plans in areas adjacent to Allison draw. The goal is to minimize the floodplain in new growth areas.

Other Alternatives None identified

Jurisdiction Laramie County, City of Cheyenne

Responsible Office Laramie County Public Works

Priority High

Cost Estimate \$50,000

Benefits Decrease flooding along and near the Allison Basin in new development areas

Potential Funding FEMA

Schedule 2013-2015

3. Wetlands Extension

Hazards Addressed Flood

Project Description and Background Laramie County would like to extend the original wetland work in the Dry Creek basin and also look at other possibilities for Crow Creek. These wetlands would help reduce flooding along the creeks and provide a natural habitat for animals. The County would like to incorporate additional Greenway space or park access for the public with these projects.

Other Alternatives None identified

Jurisdiction Laramie County

Responsible Office Laramie County Planning

Priority Medium

Cost Estimate \$305,000

Benefits Reduced flooding along the creeks; provide natural habitat and additional green space to the community.

Potential Funding Annual Budget or grant resources

Schedule Ready to move forward with any funding availability.

4. Oil and Gas Safe Development Plan

Hazards Addressed	Hazardous Materials
Project Description and Background	<p>Laramie County would like to incorporate a proactive approach and plan to address the economic, environmental, and safety concerns of the recent oil and gas development in the community.</p> <p>This plan would be geared towards protection of infrastructure and associated concerns. Damaged infrastructure has already been found in county due to heavy truck traffic. Roads, bridges, water aquifers, crossings are being impacted along with businesses.</p>
Other Alternatives	None identified
Jurisdiction	Laramie County
Responsible Office	Laramie County Planning, Laramie County Public Works, Laramie County Emergency Management
Priority	High
Cost Estimate	\$100,000
Benefits	Provide life safety, environmental protection, and economic benefits to the community for the continued development of the oil and gas industry in the County.
Potential Funding	Prevention and mitigation of loss of life and damages to property
Schedule	Ready to be included in future planning efforts.

5. Emergency Communications Systems

Hazards Addressed Multiple

Project Description and Background Several outdated communications systems still exist in Laramie County. The functions of these systems are life safety and responder safety communications. The systems are in use for day to day operations of emergency responder agencies. Because of Laramie County's expansive size, coverage issues exist due to distance and terrain. The County does not operate any backup systems such as Amateur Radio repeaters. This project includes the expansion of current systems and adapting and blending with new systems purposed by the federal government.

Progress to Date As of 2005, Cheyenne and Laramie County communicated using a very high frequency (VHF) radio system greater than 25 years old in places. Some agencies migrated from the VHF system to an 800 MHz band causing a further split in capabilities and interoperability. Cheyenne and Laramie County entered into an agreement to create a combined public safety communications center. The center has room for up to nine dispatch consoles including new telephones and replacement of the 2005 radio system.

The State of Wyoming had begun construction of statewide VHF, digital trunked radio system ("Wyolink"). Laramie County was selected as the project test site for the system. Wyolink was completed and operational in Laramie County in 2006.

Other Alternatives None identified

Jurisdiction Laramie County

Responsible Office Laramie County Combined Communications Center

Priority High

Cost Estimate \$5 Million

Benefits Life Safety

Potential Funding Special Purpose Tax, Homeland Security Funding

Schedule Ongoing

6. Outdoor Warning Systems

Hazards Addressed Multiple

Project Description and Background Laramie County and the City of Cheyenne are currently in the process of upgrading early warning sirens for the County. The majority of the sirens are located in the immediate Cheyenne area and key locations in the outlying community. Because of the rapid growth of Cheyenne and the outlying areas, expansion of the system is necessary to provide safety to the public. In 1999 the residents of Laramie County approved a tax ballot initiative that allowed for the installation or retrofitting of 30 outdoor early warning sirens. With continued growth there are still areas throughout the county which have no siren coverage. Expansion of the system is needed to continue life safety efforts.

Progress to Date The process of upgrading Laramie County's outdoor warning system has been ongoing. In the past 12 years, 48 new sirens have been added to the County. The need for up to 20 new siren locations was identified in the 2005 Laramie County HMP. In 2003 a second tax ballot initiative was passed by the voters, which authorized the expenditure of up to \$500,000 to install sirens at the identified locations.

The present system utilizes a state of the art computer controlled system. The system uses an ultra high frequency (UHF) radio system to continuously monitor the status of 30 DC model outdoor siren units capable of 360-degree rotation at a DB rating comparable to a jet engine, giving warning in a one mile circumference from the warning point.

The dispatch center continuously monitors the system via computer. Any change in status of any given unit will alert the center of the change and display the problem. The system is accessible by factory technicians via modem for quick diagnosis and repair.

Other Alternatives None identified

Jurisdiction Laramie County

Responsible Office Laramie County Emergency Management

Priority High

Cost Estimate \$1,000,000

Benefits	Life Safety
Potential Funding	Specific Purpose Tax
Schedule	2012-2013

7. Critical Infrastructure Protection: Risk Assessments and Action Plans

Hazards Addressed	Multiple
Project Description and Background	Conduct threat and risk assessments on critical infrastructures within all jurisdictions in Laramie County. The assessments will help determine which actions need to be taken to help protect these infrastructures from all hazards.
Progress to Date	<p>Efforts to protect critical infrastructure in Laramie County include the <i>Laramie County Energy Emergency Response Plan</i>, written by Energy Planning Consultants Inc., in conjunction with the Wyoming Business Council. The <i>Energy Emergency Response Plan</i> placed the infrastructure of the various communities within Laramie County in an acceptable category. Although this plan concentrated on energy vulnerabilities, the plan identified key buildings and facilities in all communities that included government buildings, banks, churches, utility installations, communications centers, transportation corridors, and petro-chemical facilities.</p> <p>Security enhancements for various government buildings in Laramie County have been ongoing since the writing of the 2005 Laramie County HMP. In 2005 Pine Bluffs was in the process of enhancing their power distribution system, including changing from a Wye (Y) to a Delta (Δ) system and installing a motion detector security system. Albin was developing a plan to install security fencing in 2005. Burns was developing a plan to install a SCADA detection system with lighting and alarms. The communities continue to pursue mitigation projects related to infrastructure protection.</p>
Other Alternatives	None identified
Jurisdiction	Laramie County, Cheyenne, Burns, Albin and Pine Bluffs
Responsible Office	Laramie County Emergency Management
Priority	High
Cost Estimate	Unknown
Benefits	Prevention and mitigation of loss of life and damages to property
Potential Funding	Homeland Security Funding; Department of Energy

Schedule

2012-2017 ongoing. Needed actions will be completed as funding is available.

8. All-Hazards Public Education

Hazards Addressed	Multiple
Project Description and Background	This project entails providing public education on all hazards, natural or manmade, using brochures, presentations, reports, and videos for selected hazards within the county. This information will provide residents with the tools to prepare accordingly in the event of an emergency or disaster. Efforts to provide all-hazards education to the public over the past seven years have included FireWise, community promotions, and brochures.
Progress to Date	Laramie County has implemented several all-hazards public education programs since 2005, including the Community Emergency Response Team (CERT) program, a shelter-in-place program, weather awareness, and FireWise.
Other Alternatives	None identified
Jurisdiction	Laramie County and all jurisdictions
Responsible Office	Participating agencies in all jurisdictions
Priority	High
Cost Estimate	\$50,000
Benefits	Preparing residents and business will help protect life safety and assist with property preservation.
Potential Funding	Annual budget
Schedule	Ongoing

9. Tornado Shelters

Hazards Addressed	Tornadoes
Project Description and Background	Laramie County has numerous high risk housing developments that do not have suitable sheltering. This project would evaluate the feasibility of Tornado Shelters for high risk areas of Laramie County and all jurisdictions within.
Other Alternatives	None identified
Jurisdiction	Laramie County, Albin, Burns and Pine Bluffs
Responsible Office	Laramie County Emergency Management
Priority	High
Cost Estimate	\$1,500,000
Benefits	Prevention and mitigation of injury and potential loss of life
Potential Funding	FEMA, SLIB, or other grants available
Schedule	As funding becomes available

10. Development of Community Wildfire Protection Plans for Fire Districts 2, 8, and 10

Hazards Addressed	Wildland Fire
Project Description and Background	The three fire districts west of Interstate 25 have a severe fire hazard and are adjacent to national forest with large areas of standing dead timber. Over eight hundred homeowners live in this area. There were no development standards prior to 2006 when the majority of the homes were built. Laramie county has experienced heavy Bark Beetle Kill and drought conditions over the last several years in these areas. A fuels mitigation effort is in the infancy stage but will take several years to have any affect. Community Wildfire Protection Plans (CWPPs) for these fire districts are needed so that high risk areas can be identified and specific fuels treatment and other mitigation recommendations can be developed and implemented. These CWPPs should examine pine beetle issues as they relate to wildland fire risk.
Other Alternatives	None identified
Jurisdiction	Fire Districts 2, 8, and 10
Responsible Office	Laramie County Fire Warden
Priority	High
Cost Estimate	\$60,000
Benefits	A fire conflagration with the potential for large property and life losses.
Potential Funding	USFS and State Division of Forestry
Schedule	2013-2016

Town of Albin Mitigation Actions

11. Installation of Backup Generator at Railroad Well in Albin

Hazards Addressed Multiple

Project Description and Background The Town of Albin's water supply is derived solely from groundwater. We rely strictly on electricity to pump our water into our water supply system. Power outages due to weather or other natural disasters or man-made disasters can interrupt water supply. This project would entail purchase and installation of a backup generator at Railroad Well.

Other Alternatives No other water source available

Jurisdiction Town of Albin

Responsible Office Town of Albin Public Works

Priority High

Cost Estimate 120/240 back-up generator \$3,450, not including installation costs

Benefits Would avoid interruption of water supply service due to power loss to well

Potential Funding TBD

Schedule As soon as possible

12. Upgrade Security at Water and Wastewater Infrastructure in Albin

Hazards Addressed	Multiple
Project Description and Background	Terrorism is on the increase and situations around the globe have become more volatile. The Town of Albin needs upgraded security for its water and wastewater infrastructure to mitigate potential impacts from terrorists or criminals. This project would include installing two Sensaphone 1800 auto dialers, 2 combination mechanical entry access locks, camera surveillance system including DVR, and six feet high 9 gauge chain link fence w/barbed wire.
Other Alternatives	Hazmat at a fixed facility. Other alternatives not practical.
Jurisdiction	Town of Albin
Responsible Office	Town of Albin Public Works
Priority	High
Cost Estimate	\$4,989.90 not including gates and installation fees or chain link @ \$18.00 per linear foot
Benefits	Installation of items listed above greatly reduces risks terrorist acts against our water supply.
Potential Funding	TBD
Schedule	As soon as possible

13. Installation of Backup Generator at Albin Community Center

Hazards Addressed	Multiple
Issue/Background	The Town of Albin Community Center, designated as emergency shelter, needs a backup generator in case of severe weather or other natural hazards.
Other Alternatives	None available
Jurisdiction	Town of Albin
Responsible Office	Town of Albin Public Works
Priority	High
Cost Estimate	120 – 240 volt, 60 kw 250 amp generator, \$13,544 plus installation costs
Benefits	Albin is at least 20 minutes or more from Cheyenne or other emergency personnel or other outlying community's emergency personnel.
Potential Funding	TBD
Schedule	Would like to implement as soon as possible

**14. Upgrade Personal Protective Equipment and Other Safety Gear for Albin
Emergency Services Personnel**

Hazards Addressed	Multiple
Project Description and Background	Often times Public Service personnel are required to respond to hazardous airborne emergencies. The Town needs personal safety equipment (SCBA, multi-gas detectors, etc.) to respond safely, including an AED.
Other Alternatives	Not to respond. Rely on fire personnel only.
Jurisdiction	Town of Albin
Responsible Office	Public Service – Public Works
Priority	Medium
Cost Estimate	\$5,799.90
Benefits	Potential life loss, personnel safety
Potential Funding	TBD
Schedule	TBD

15. Purchase Additional Traffic Control Equipment and Signage for Emergency Evacuations in Albin

Hazards Addressed	Multiple
Project Description and Background	This project would entail the purchase of 25 type 1 barricades, reflective cones, stop / slow paddles for all evacuation traffic control.
Other Alternatives	None identified
Jurisdiction	Town of Albin
Responsible Office	Albin Public Works Department
Priority	Low
Cost Estimate	\$1,485
Benefits	Protect life safety and make evacuations run more smoothly
Potential Funding	TBD
Schedule	As soon as possible

Town of Burns Mitigation Actions

16. Development of Stormwater Drainage Plan for the Town of Burns

Hazards Addressed	Flood
Project Description and Background	This project would entail the development of a stormwater drainage plan to eliminate localized water flooding within the area and town.
Other Alternatives	None identified
Jurisdiction	Town of Burns
Responsible Office	Township of Burns
Priority	Medium
Cost Estimate	Unknown
Benefits	Prevention and mitigation of loss of life and damages to property
Potential Funding	Partially approved via 6 th Penny passage in August 2012. Grants, SLIB, EMA programs as additional funding sources.
Schedule	Initial work will be completed with current funding. Additional required work will be funded and then completed.

17. Development of Hazardous Materials Plan for the Town of Burns

Hazards Addressed Hazardous Materials

Project Description and Background The Town of Burns is at risk to hazardous materials incidents from the nearby railroad and truck traffic on roads. This project would entail the development of an official town oriented program to work with and comply with the county-level plan hazardous materials response plan.

Other Alternatives None identified

Jurisdiction Town of Burns

Responsible Office Township of Burns

Priority Medium

Cost Estimate Unknown

Benefits Education, prevention/mitigation of loss of life, preserve property

Potential Funding Grants, SLIB, EMA programs as possible funding sources.

Schedule Needed actions will be completed as money becomes available.

18. Purchase Emergency Power Automatic Generators for Burns-Plex

Hazards Addressed	Multiple
Project Description and Background	The two government buildings in the Town of Burns have been proposed as an evacuation center. We do not have generators to supply power to these buildings in case of extended power outages. Backup generators are needed for shelter and continuity of government purposes.
Other Alternatives	No alternatives.
Jurisdiction	Town of Burns
Responsible Office	Town Mayor/Council
Priority	Medium
Cost Estimate	\$327,000.00
Benefits	Ability to provide power in event of use as evacuation center. This will allow us to keep food cold as well as prepare it, have lights, and electrical supply to support evacuees.
Potential Funding	Will need to apply for a grant as there is no available town funding.
Schedule	We would hope to complete this during 2013, depending on funding availability.

Town of Pine Bluffs Mitigation Actions

19. Southeast Pine Bluffs Drainage Project

Hazards Addressed Flood

Project Description and Background The existing drainage/catch basin in the Town of Pine Bluffs southeast quadrant is unable to handle significant rainfall and runoff. The drainage/catch basin needs to be upgraded to mitigate flood issues in that part of Pine Bluffs.

Other Alternatives No action

Jurisdiction Town of Pine Bluffs

Responsible Office Pine Bluffs Department of Public Works

Priority High

Cost Estimate \$250,000

Benefits Reduces losses of life and property due to flooding.

Potential Funding SLIB, FEMA

Schedule As soon as possible

20. Clean Up and Expansion of Existing Drainage at Highway 30 North to North Beech St. to Lodge Pole Creek

Hazards Addressed	Flood
Project Description and Background	The ditch located at the railroad tracks/Highway 30 has a lack of carrying capacity due to silting. North Beech requires resizing of the culvert and continuation of the drainage ditch to Lodge Pole Creek.
Other Alternatives	No action
Jurisdiction	Town of Pine Bluffs
Responsible Office	Pine Bluffs Department of Public Works
Priority	High
Cost Estimate	Up to \$1 million due to unforeseen complications with railroad track.
Benefits	Reduces losses of life and property due to flooding.
Potential Funding	FEMA, local or state resources
Schedule	As soon as possible

21. Upsizing Pine Bluffs Downtown Stormwater Drainage

Hazards Addressed	Flood
Project Description and Background	The drainage system in downtown Pine Bluffs is unable to handle stormwater drainage from Blair to Main Street. The drainage system needs to be upsized to handle the volume of stormwater downtown.
Other Alternatives	None available
Jurisdiction	Town of Pine Bluffs
Responsible Office	Town of Pine Bluffs Department Public Works
Priority	High
Cost Estimate	\$1 million.
Benefits	Reduces losses of life and property due to flooding.
Potential Funding	FEMA, local or state resources
Schedule	As soon as possible

22. Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program in the Town of Pine Bluffs

Hazards Addressed Flood

Project Description and Background The Town of Pine Bluffs participates in the National Flood Insurance Program. This project restates the commitment of the Town of Pine Bluffs to implement sound floodplain management practices, as stated in the flood damage prevention ordinance. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development is elevated to or above the base flood elevation. Floodplain managers will remain current on NFIP policies, and are encouraged to attend appropriate training and consider achieving Certified Floodplain Manager (CFM) status.

This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and adequately addresses the level of flood risk identified within the Hazard Mitigation Plan.

Other activities that could be included in this effort are:

- Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance;
- Suggest changes to improve enforcement of and compliance with regulations and programs;
- Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;
- Utilize Digital Flood Insurance Rate maps in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits;
- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the Wyoming Office of Homeland Security.
- Continue to participate in the Community Rating System to further lower the cost of flood insurance for residents

Other Alternatives	No action
Jurisdiction	Town of Pine Bluffs
Responsible Office	Pine Bluffs Public Works/Utilities Department Director
Priority	Low
Cost Estimate	Low
Benefits	Reduced property loss from floods; continued availability of flood insurance for residents; reduced vulnerability of new development to flooding
Potential Funding	Covered in existing budget
Schedule	Ongoing

23. Purchase Portable Backup Generation for Town Water Wells

Hazards Addressed	Multiple
Project Description and Background	The Town of Pine Bluffs water supply is derived solely from groundwater. We rely strictly on electricity to pump our water into our water supply system. Power outages due to weather or other natural disasters or manmade disasters can interrupt water supply, so backup generation is needed.
Other Alternatives	No other water source available
Jurisdiction	Town of Pine Bluffs
Responsible Office	Town of Pine Bluffs Waterworks
Priority	High
Cost Estimate	150KW generator. \$30,000 for one. \$60,000 for two.
Benefits	Would avoid interruption of water supply service due to power loss to well. Needed for human consumption and fire suppression.
Potential Funding	TBD
Schedule	As soon as possible

24. Purchase Portable Backup Generation for Community Center

Hazards Addressed	Multiple
Project Description and Background	The Town of Pine Bluffs Community Center, designated as emergency shelter, needs a backup generator in case of severe weather or other natural hazards or manmade disasters.
Other Alternatives	None available
Jurisdiction	Town of Pine Bluffs
Responsible Office	Town of Pine Bluffs
Priority	High
Cost Estimate	225KW generator. \$50,000.
Benefits	Would provide shelter for Pine Bluffs and surrounding area residents.
Potential Funding	TBD
Schedule	As soon as possible

25. Underground the Pine Bluffs Electrical System

Hazards Addressed Multiple

Project Description and Background The above-ground electrical grid system in Pine Bluffs is highly susceptible to natural and man-made disasters. If Pine Bluffs does not underground its electrical grid system, it could face extended power outages for long lengths of time, leaving the town without water, sewer, and emergency services. This creates a life safety and health hazard and could interrupt critical services.

Other Alternatives None available

Jurisdiction Town of Pine Bluffs

Responsible Office Town of Pine Bluffs Department Public Works

Priority High

Cost Estimate \$5 million.

Benefits Reduces losses of life and property.

Potential Funding FEMA, local or state resources

Schedule As soon as possible

26. Purchase Traffic Control Equipment and Signage for Emergency Evacuations in Pine Bluffs

Hazards Addressed	Multiple
Project Description and Background	This project would entail the purchase of 50 type 1 barricades, reflective cones, and stop/slow paddles for all evacuation traffic control.
Other Alternatives	None identified
Jurisdiction	Town of Pine Bluffs
Responsible Office	Town of Pine Bluffs Department Public Works
Priority	Medium
Cost Estimate	\$5,000
Benefits	Reduces losses of life and property.
Potential Funding	TBD
Schedule	As soon as possible

APPENDIX A.2 CITY OF CHEYENNE MITIGATION ACTIONS

27. Development of Belvoir Groundwater Pipeline

Hazards Addressed	Drought
Project Description and Background	This project would entail developing a pipeline that would deliver water resources from wells on the Belvoir Ranch to Cheyenne's water system.
Other Alternatives	None identified
Jurisdiction	City of Cheyenne
Responsible Office	Board of Public Utilities
Priority	Medium
Cost Estimate	\$45,000,000
Benefits	The pipeline would provide additional water resources to the City of Cheyenne during times of drought.
Potential Funding	Wyoming Water Development Commission and State Revolving Fund Grants and Loans
Schedule	Project tentatively scheduled, with construction to occur in two phases, in Fiscal Years 2015 and 2016.

28. Expansion of Reservoir Storage/Collection Capabilities

Hazards Addressed Drought

Project Description and Background This project would entail ongoing expansion of reservoir storage in additional locations to increase collection capabilities. This would include expanding storage capabilities in Seminoe Reservoir from 10,000 to 15,700 acre-feet. This will increase Cheyenne's ability to trade for water through the Stage I/II system.

Other Alternatives None identified

Jurisdiction City of Cheyenne

Responsible Office Board of Public Utilities

Priority Medium

Cost Estimate Unknown

Benefits Increase storage capacity minimizes short-term drought impacts and would allow for water transfers during drought.

Potential Funding TBD

Schedule TBD

29. Expansion of Current Recycled Water System

Hazards Addressed	Drought
Project Description and Background	An expansion of current recycled water system is needed to allow the City to become more resilient to drought and extend potable water supplies.
Other Alternatives	None identified
Jurisdiction	City of Cheyenne
Responsible Office	Board of Public Utilities
Priority	Low
Cost Estimate	\$20,800,000
Benefits	Reduce irrigation water demand on existing water resources by irrigating with recycled water.
Potential Funding	\$7,800,000
Schedule	Expansions to Mylar Park, Central High School, and McCormick Junior High tentatively planned for Fiscal Years 2017 and 2018.

30. Reduce Flood Damage Potential in Clear Creek Basin

Hazards Addressed	Flood
Project Description and Background	The City's Clear Creek drainage basin is roughly the fourth highest priority on the flood control project list due to life-safety hazards. According to the 2005 City of Cheyenne HMP, a 2004 City revised list of recommended flood control projects for the Clear Creek Basin was estimated to cost \$6,856,000 (2004 dollars). The estimated cost in 2012 would be \$8,227,000 using an adjustment for inflation factor of 1.2. Clear Creek basin sub-projects are listed in Table A.1.
Progress to Date	Twelve flood hazard mitigation projects have been recommended for the Clear Creek drainage basin as of 2012. One of those projects, removing a radio station building, has been completed to date.
Other Alternatives	None identified
Jurisdiction	City of Cheyenne
Responsible Office	City of Cheyenne Engineering Department
Priority	High
Cost Estimate	\$8,227,000
Benefits	Reduce losses to life and property due to flooding in the Clear Creek basin
Potential Funding	FEMA, City of Cheyenne and state sources
Schedule	Ongoing over the next 20 years

Table A.1. Clear Creek Basin Flood Mitigation Sub-projects

Reach	Structure Number	Master Plan Proposed Facilities			Committee Recommended Facilities			Δ Costs (\$1,000)*	Comments/Other Uses	Basin Project Rank	Overall Project Rank
		Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*	Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*				
Deming Dr. and Ames Ave.	11	S	RCB Culverts	2,042.4	N/S	Dike, purchase property	559.2	(1,483.2)		High	High
Parsley Blvd.	9	S	RCB Culvert	1,868.4	S	Smaller RCB Culvert	1,304.4	(564)		High	Medium
Downstream from Parsley Blvd.	10	S	Channel Improvement	936	S	Same as 1988 plan	936	0		High	Medium
Southwest Drive	4	S	Lengthen Culverts	175.2	S	Same as 1988 plan	175.2	0	Provides additional detention	High	Medium
Downstream from BNRR	8	N/S	Channel Improvement	1,610.4	N/S	Same as 1988 plan	1,610.4	0	Cost reduction due to additional upstream detention and smaller culverts. Area could be used for recreation/open space.	Medium	Medium
Upstream from BNRR	7a				N/S	Dike with outflow weir	559.2	559.2	Downsized due to additional upstream detention	Medium	Low
West of I-25	1	S	Dike	564	S	Same as 1988 plan	564	0		Low	Low

Reach	Structure Number	Master Plan Proposed Facilities			Committee Recommended Facilities			Δ Costs (\$1,000)*	Comments/Other Uses	Basin Project Rank	Overall Project Rank
		Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*	Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*				
I-25	2	S	36" Culvert	1,146	S	Same as 1988 plan	1,146	0		Low	Low
Southwest Drive	3	S	Dike	493.2	S	Same as 1988 plan	493.2	0		Low	Low
Southwest Drive	5	S	Raise Roadway	134.4	S	Same as 1988 plan	134.4	0	Downsized due to additional upstream detention	Low	Low
BNRR Culvert	7	S	Plunge Pool structure	2,402.4	S	Smaller Structure	745.2	(1,657.2)	Project could include additional detention structures	Low	Low
Total				11,372	Total			8, 227	(3,145)		

*Costs inflated from 2004 dollars assumes an inflation factor of 1.2

31.Reduce Flood Damage Potential in Crow Creek Basin

Hazards Addressed	Flood
Project Description and Background	The City's Crow Creek drainage basin is the third highest flood control priority. According to the 2005 City of Cheyenne HMP, a 2004 City revised list of recommended flood control projects for the Crow Creek Basin was estimated to cost \$12,608,000 (2004 dollars). Adjusting for inflation at a rate of 1.2, the estimated cost in 2012 would be \$15,130,000. However several flood hazard mitigation projects have been completed in the Crow Creek basin, reducing the cost estimate to \$12,137,000. Twenty-five flood hazard mitigation projects have been recommended for the Crow Creek drainage basin as of 2012. Crow Creek basin sub-projects are listed in Table A.2.
Progress to Date	Four of those projects have been completed to date. These projects included additional culverts and floodwalls.
Other Alternatives	None identified
Jurisdiction	City of Cheyenne
Responsible Office	City of Cheyenne Engineering Department
Priority	High
Cost Estimate	\$12,137,000
Benefits	Reduce losses to life and property due to flooding in the Crow Creek basin
Potential Funding	FEMA, City of Cheyenne and state sources
Schedule	Ongoing over the next 20 years

Table A.2. Crow Creek Basin Flood Mitigation Sub-projects

Reach	Structure Number	Master Plan Proposed Facilities			Committee Recommended Facilities			Δ Costs (\$1,000)*	Comments/Other Uses	Basin Project Rank	Overall Project Rank
		Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*	Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*				
Proposed off-line detention facility					N	300 acre-foot pond	4,293.6	4,293.6	Proposed off-line detention facility	High	High
19 th St.	4	S	New Bridge	560.4	S	Bridge replacement	1,760.4	1,200	Bridge replacement	High	High
I-25 to Missile Dr.	1 & 2	S	Channel & Berm	2,642.4	S	Same as 1988 plan	0	(2,642.4)	Westland Rd. project has dampened benefits	Medium	Low
Missile Dr. to 19 th St.	3	N	Channel Maintenance	1.2	N	Same as 1988 plan	1.2	0		Low	Low
19 th St. to W. Lincolnway	5	S	Concrete Walled Channel	1,981.2	S	Same as 1988 plan	0	(1,981.2)	May not be necessary with 19 th St. bridge replacement	Low	Low
Downstream from W. Lincolnway	6	S	Channel Improvements	1,220.4	S	Same as 1988 plan	0	(1,220.4)	May not be necessary with upstream detention.	Low	Low
Downstream from W. Lincolnway	7	S	Floodwall	97.2	S	Same as 1988 plan	0	(97.2)	May not be necessary with upstream detention.	Low	Low
Ames Ave. Underpass	8	N	Channel Maintenance & low flow channel	331.2	N	Same as 1988 plan	331.2	0		Low	Low

Reach	Structure Number	Master Plan Proposed Facilities			Committee Recommended Facilities			Δ Costs (\$1,000)*	Comments/Other Uses	Basin Project Rank	Overall Project Rank
		Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*	Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*				
Ames Ave. Downstream	9	S	Lined Channel	6,351.6	S	Same as 1988 plan	0	(6,351.6)	May not be necessary with upstream detention.	Low	Low
Upstream from 9 th St.	10	S	Floodwall & Berm	70.8	S	Same as 1988 plan	70.8	0		Low	Low
9 th St. Underpass	11	S	Replace Bridge	1,416	S	Same as 1988 plan	0	(1,416)	Potential floodway impact with bridge replacement	Low	Low
9 th St. downstream	12 & 13	S	Channel Improvements & Floodwall	1,764	S	Same as 1988 plan	1,764	0		Low	Low
Between 9 th St. and 5 th St.	14	S	Lengthen Pedestrian Overpass	16.8	S	Same as 1988 plan	16.8	0		Low	Low
5 th St.	15	S	Replace Bridge	1,226.4	S	Same as 1988 plan	0	(1,226.4)	Potential floodway impact with bridge replacement	Low	Low
5 th St. to Central Ave.	16 & 17	S	Channel & Berm	1,615.2	S	Same as 1988 plan	600	(1,015.2)	Property acquisition in this reach could reduce downstream structure sizes for #'s 18 & 19. Potential for recreation/open space from area acquired.	Low	Low
Central Ave.	18	S	Additional Culverts	6,289.2	S	Same as 1988 plan	0	(6,289.2)	Not necessary with elimination of Warren Crossing	Low	Low

Reach	Structure Number	Master Plan Proposed Facilities			Committee Recommended Facilities			Δ Costs (\$1,000)*	Comments/Other Uses	Basin Project Rank	Overall Project Rank	
		Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*	Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*					
Warren Ave. to Demming Dr.	20 & 21	S	Channel & Berm	613.2	S	Same as 1988 plan	0	(613.2)	Not necessary with elimination of Warren Crossing and Riverine	Low	Low	
Demming Dr. downstream	23	S	Channel Improvements	2,256	S	Same as 1988 plan	2,256	0		Low	Low	
Morrie Ave. to WHR #1	26a	N	Channel Maintenance	40.8	N	Same as 1988 plan	40.8	0		Low	Low	
WHR #1 downstream	26b	N	Channel Maintenance	44.4	N	Same as 1988 plan	44.4	0		Low	Low	
Campstool Rd.	27	S	Additional Culverts	957.6	S	Same as 1988 plan	957.6	0		Low	Low	
Total				29,496	Total			12,137	(17,359)			

*Costs inflated from 2004 dollars assumes an inflation factor of 1.2

32.Reduce Flood Damage Potential in Dry Creek Basin

Hazards Addressed Flood

Project Description and Background The Dry Creek drainage basin is the City's second priority for flood control. According to the 2005 City of Cheyenne HMP, a 2004 City revised list of recommended flood control projects for the Dry Creek Basin was estimated to cost \$14,656,000 (2004 dollars). Adjusting for inflation at a rate of 1.2, the estimated cost in 2012 would be \$17,587,000. However several flood hazard mitigation projects have been completed in the Dry Creek basin, and several projects added, reducing the cost estimate to \$15,402,000. Forty-four flood hazard mitigation projects have been recommended for the Dry Creek drainage basin as of 2012. Dry Creek basin sub-projects are listed in Table A.3.

Progress to Date Thirteen of those projects have been completed and nine projects have been eliminated to date. These projects included channel re-alignment, detention, trail and channel maintenance, floodwalls, culvert replacement, and raising roadways. This includes the Dry Creek-Sheridan Reach Flood Control Improvement Project that was completed in 2009, one the largest flood control project completed in the area using FEMA PDM funding. An additional trail and channel maintenance project was partially completed. During the 2012 plan update process, one new subproject was added to enlarge a Union Pacific Railroad culvert. Six projects that had been deleted from the 2005 City of Cheyenne HMP were added back to the 2012 plan update.

Other Alternatives None identified

Jurisdiction City of Cheyenne

Responsible Office City of Cheyenne Engineering Department

Priority High

Cost Estimate \$15,402,000

Benefits Reduce losses to life and property due to flooding in the Dry Creek basin

Potential Funding FEMA, City of Cheyenne and state sources

Schedule Ongoing over the next 20 years

Table A.3. Dry Creek Basin Flood Mitigation Sub-projects

Reach	Structure Number	Master Plan Proposed Facilities			Committee Recommended Facilities			Δ Costs (\$1,000)*	Comments/Other Uses	Basin Project Rank	Overall Project Rank
		Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*	Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*				
South Fork	3	N	Detention Pond	1,430.4	N	100 acre ft. pond	1,430.4	0		High	High
Prairie Ave.	14	S	Larger Culverts	478.8	N	Remove Crossing	56.4	(422.4)		High	High
Dell Range Blvd. & Powderhouse Rd.	15	N	Detention Pond	3,518.4	N	Same with purchase of homes & property	4,635.6	1,117.2	Additional detention and property acquisition; area could be used for recreation/open space.	High	High
UPRR		S	Additional Culverts				400	400	Existing undersized culvert. Existing flood depths are approximately 18 feet at the railroad embankment.	High	High
Education Dr.	7	S	Larger Culverts	559.2	S	Dike to increase storage	279.6	(279.6)	Enlarge pond to increase storage by adding dike.	Medium	Medium
Mountain Rd.	19	S	Larger Culverts	434.4	S	Same as 1988 plan	434.4	0	Existing undersized culvert.	Medium	Medium
Hilltop Ave.	21	S	Replace Culverts	484.8	S	Same as 1988 plan	484.8	0	Existing undersized culvert.	Medium	Medium
Dell Range Blvd.	22	S	Additional Culverts	414	S	Same as 1988 plan	414	0	Existing undersized culvert.	Medium	Medium
Upstream of UPRR	37	N	Property Purchase	279.6	N	Same as 1988 plan	279.6	0	Existing undersized culvert.	Medium	Medium
UPRR to Campstool Rd.	38	S	Detention Pond	651.6	S	Same as 1988 plan	651.6	0		Medium	Medium

Reach	Structure Number	Master Plan Proposed Facilities			Committee Recommended Facilities			Δ Costs (\$1,000)*	Comments/Other Uses	Basin Project Rank	Overall Project Rank
		Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*	Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*				
Campstool Rd.	39	S	Additional Culverts	162	S	Same as 1988 plan	162	0	Existing undersized culverts downstream.	Medium	Medium
North Fork	2	S	Storm Sewer	6,171.6	N/S	Purchase homes in floodway	4,658.4	(1,513.2)	Small park and open space area	Low	Low
City Limit	4	S	Remove Crossing	2.4	S	Same as 1988 plan	2.4	0		Low	Low
Vista Lane to I-25	5	S	Channel Improvements	24	S	Same as 1988 plan	24	0		Low	Low
I-25	5a				S	Enlarge culverts with WDOT project	500	500	Maintain use of roadway during flood events	Low	Low
I-25 to Education Drive	6	N	Flood Plain Maintenance	1.2	N	Same as 1988 plan	1.2	0	Increase capacity of existing pond.	Low	Low
Education Dr. to Yellowstone Rd.	8	N	Flood Plain	1.2	N	Same as 1988 plan	1.2	0	7, 8, 9, 10 and 10a should be designed together and done as one project or phases of one project.	Low	Low
Westgate right-of-way	10	S	Channel Improvement	175.2	S	Same as 1988 plan	175.2	0		Low	Low
Westgate right-of-way to Yellowstone Rd.	10a			0	S	Emergency Spillway	186	186	Relief of flooding along Carlson St. to Dry Creek	Low	Low
Yellowstone Rd. to Dell Range Blvd.	12	N	Trail & Channel Maintenance	320.4	N	Partially Completed	134.4	(186)		Low	Low
Seminole Rd.	13	S	Larger Culverts	468	S	Same as 1988 plan	468	0		Low	Low

Reach	Structure Number	Master Plan Proposed Facilities			Committee Recommended Facilities			Δ Costs (\$1,000)*	Comments/Other Uses	Basin Project Rank	Overall Project Rank
		Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*	Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*				
Downstream from Pershing Blvd.	35	N	Channel Maintenance	22.8	N	Same as 1988 plan	22.8	0		Low	Low
			Total	15,600		Total	15,402	(198)			

*Costs inflated from 2004 dollars assumes an inflation factor of 1.2

33. Reduce Flood Damage Potential in Henderson and E. Lincolnway Basin

Hazards Addressed	Flood
Project Description and Background	The Henderson and E. Lincolnway drainage basin is the City's fifth highest priority for flood control. According to the 2005 City of Cheyenne HMP, a 2004 City revised list of recommended flood control projects for the Henderson and E. Lincolnway basin was estimated to cost \$8,000,000 (2004 dollars). Adjusting for inflation at a rate of 1.2, the estimated cost in 2012 would be \$9,600,000. Several flood hazard mitigation projects have been completed, and a couple of projects have been added in the Henderson and E. Lincolnway basin, increasing the cost estimate to \$18,576,000. Twenty-four flood hazard mitigation projects have been recommended for the Henderson and E. Lincolnway drainage basin as of 2012. Henderson and E. Lincolnway basin sub-projects are listed in Table A.4.
Progress to Date	Twelve of those projects have been completed and two projects have been eliminated to date. The completed projects included a detention pond, headwall, plunge pool, channel improvements, new culverts, and detention of headwaters. The eliminated projects included new culverts and channel improvements. Two projects that had been deleted from the 2005 City of Cheyenne HMP were added back to the 2012 plan update.
Other Alternatives	None identified
Jurisdiction	City of Cheyenne
Responsible Office	City of Cheyenne Engineering Department
Priority	High
Cost Estimate	\$18,576,000
Benefits	Reduce losses to life and property due to flooding in the Henderson and E. Lincolnway basin
Potential Funding	FEMA, City of Cheyenne and state sources
Schedule	Ongoing over the next 20 years

Table A.4. Henderson and E. Lincolnway Basin Flood Mitigation Sub-projects

Reach	Structure Number	Master Plan Proposed Facilities			Committee Recommended Facilities			Δ Costs (\$1,000)*	Comments/Other Uses	Basin Project Rank	Overall Project Rank
		Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*	Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*				
Pershing to Holmes St.	14	S	Channel improvements	553.2	S	Same as 1988 plan	553.2	0		High	Medium
E. Lincolnway Headwaters	13	S	New Storm Drains	3,272.4	S	Same as 1988 plan	3,272.4	0	Existing undersized storm sewer.	Medium	Medium
Henderson Drive	1	S	New storm Drains	11,649.6			7,856.4	(3,793.2)	Existing undersized storm sewer.	Medium	Medium
Kelly Dr.	2	S	Channel improvements	60	S	Same as 1988 plan	60	0		High	Low
Kelly Dr.	3	S	New Culverts	20.4	S	Same as 1988 plan	20.4	0		High	Low
12 th St.	21	S	New Culverts	1,456.8	S	Downsize to 2-10x6' RCB	931.2	(525.6)	Due to additional detention with Wills Rd. pond	Low	Low
College Dr. to WDOT Detention Pond	22	S	Channel improvements	1,136.4	S	Same as 1988 plan	1,136.4	0		Low	Low
Monroe Ave.	23	S	New Storm Drains	2,120.4	S	New Storm Drains	1,676.4	(444)		Low	Low
Converse Ave., 16 th Fremont and	25	S	New Storm Drains &	2,510.4	S	Same as 1988 plan	2,510.4	0		Low	Low

Reach	Structure Number	Master Plan Proposed Facilities			Committee Recommended Facilities			Δ Costs (\$1,000)*	Comments/Other Uses	Basin Project Rank	Overall Project Rank
		Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*	Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*				
11th			Inlets								
Holmes St. to E. Lincolnway	16	S	Channel improvements	1,250.4	Wills Detention Pond	Partially completed	559.2	(691.2)	Soccer - Play Fields	Low	Low
			Total	24,030		Total	18,576	(5,454)			

*Costs inflated from 2004 dollars assumes an inflation factor of 1.2

34. Reduce Flood Damage Potential in Holliday Basin

Hazards Addressed	Flood
Project Description and Background	According to the 2005 City of Cheyenne HMP, a 2004 City revised list of recommended flood control projects for the Holliday basin was estimated to cost \$2,002,000 (2004 dollars). Adjusting for inflation at a rate of 1.2, the estimated cost in 2012 would be \$2,402,000. The exact cost estimate provided by the HMPC is \$2,402,000. Four flood hazard mitigation projects have been recommended for the Holliday drainage basin as of 2012. Holliday basin sub-projects are listed in Table A.5.
Progress to Date	One of those projects has been completed to date. Proposed projects include a lake control structure, and storm drains.
Other Alternatives	None identified
Jurisdiction	City of Cheyenne
Responsible Office	City of Cheyenne Engineering Department
Priority	High
Cost Estimate	\$2,402,000
Benefits	Reduce losses to life and property due to flooding in the Holliday basin
Potential Funding	FEMA, City of Cheyenne and state sources
Schedule	Ongoing over the next 20 years

Table A.5. Holliday Basin Flood Mitigation Sub-projects

Reach	Structure Number	Master Plan Proposed Facilities			Committee Recommended Facilities			Δ Costs (\$1,000)*	Comments/Other Uses	Basin Project Rank	Overall Project Rank
		Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*	Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*				
Holliday Park	1	N	Lake Control	74.4	S	Same as 1988 plan	74.4	0		Low	Low
19 th to 22 nd St.	2	S	Storm Drains	2,664	S	Downsize to 1 pipe	837.6	(1,826.4)	Downsizing of #'s 2 & 3 due to Airport Parkway detention, property acquisition, & Morrie Ave. Proj.	Low	Low
22 nd to Pershing Blvd.	3	S	Storm Drains	1,928.4	S	Downsize	1,490.4	(438)		Low	Low
Total				4,667	Total			2,402	(2,265)		

*Costs inflated from 2004 dollars assumes an inflation factor of 1.2

35. Reduce Flood Damage Potential in Lower Capitol Basin

Hazards Addressed Flood

Project Description and Background The Lower Capitol drainage basin is the City's highest priority for flood control. According to the 2005 City of Cheyenne HMP, a 2004 City revised list of recommended flood control projects for the Lower Capitol basin was estimated to cost \$11,303,000 (2004 dollars). Adjusting for inflation at a rate of 1.2, the estimated cost in 2012 would be \$13,564,000. Several flood hazard mitigation projects have been completed in the Lower Capitol basin, and a project added, increasing the cost estimate to \$20,897,000. Five flood hazard mitigation projects have been recommended for the Lower Capitol drainage basin as of 2012. Lower Capitol basin sub-projects are listed in Table A.6.

Progress to Date Three sub-projects have been completed to date. The completed projects included a storm sewer, a detention pond, and analysis/evaluation of the Capitol basin storm drainage system. One project that had been deleted from the 2005 City of Cheyenne HMP was added back to the 2012 plan update.

Other Alternatives None identified

Jurisdiction City of Cheyenne

Responsible Office City of Cheyenne Engineering Department

Priority High

Cost Estimate \$20,897,000

Benefits Reduce losses to life and property due to flooding in the Lower Capitol basin

Potential Funding FEMA, City of Cheyenne and state sources

Schedule Ongoing over the next 20 years

Table A.6. Lower Capitol Basin Flood Mitigation Sub-projects

Reach	Structure Number	Master Plan Proposed Facilities			Committee Recommended Facilities			Δ Costs (\$1,000)*	Comments/Other Uses	Basin Project Rank	Overall Project Rank
		Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*	Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*				
26 th St. - Ames Ct.	2a, 2b	S	Storm Drain	13,443.6	S	Same as 1988 plan	13,443.6	0	Refinement of these Designs is necessary. Detention potential.	High	High
18th St			Storm Sewer		S	36" to 60" RCP	7,453.2	7,453.2	Existing undersized storm sewer.	Medium	Medium
			Total	13,444		Total	20,897	7,453			

*Costs inflated from 2004 dollars assumes an inflation factor of 1.2

36. Reduce Flood Damage Potential in Upper Capitol Basin

Hazards Addressed Flood

Project Description and Background The Upper Capitol drainage basin refers to the part of the basin west of Interstate 25, including F.E. Warren Air Force Base (AFB). Anything downstream of the Base is included in the Lower Capitol drainage basin. In the 2005 City of Cheyenne HMP, Capitol basin was not split into upper and lower sections. This is a new approach in the 2012 plan update. As part of the Capitol basin, the Upper Capitol drainage basin is also considered the City's highest priority for flood control. The 1988 Drainage Master Plan identified a project in the Upper Capitol basin to mitigate flood hazards within the Capitol Basin. Prior to the 2005 HMP the U.S. Army Corps of Engineers (USACE) prepared a drainage study and design plans to mitigate flood hazards within the AFB, and downstream within the Lower Capitol basin. One flood hazard mitigation project has been recommended for the Upper Capitol drainage basin as of 2012. This project entails upgrading the stormwater drainage system on the AFB. Upper Capitol basin sub-projects are listed in Table A.7.

Progress to Date A project was originally proposed in the 1988 Capitol Basin Drainage Master Plan. The U.S. Army Corps of Engineers revised the plan with analysis and design in 2005. Phase I of the project was constructed. The rest of the project needs to be funded and constructed.

Other Alternatives Upstream stormwater detention

Jurisdiction Federal Government, City of Cheyenne, Laramie County

Responsible Office F.E. Warren Air Force Base, U.S. Army Corps of Engineers

Priority High

Cost Estimate \$12,000,000

Benefits Reduce losses to life and property in downtown Cheyenne due to flooding in the Upper and Lower Capitol basins

Potential Funding USACE, FEMA, City of Cheyenne and state sources

Schedule Ongoing, target of 5 years for upgrading the stormwater detention system on F.E. Warren AFB

Table A.7. Upper Capitol Basin Flood Mitigation Sub-projects

Reach	Structure Number	Master Plan Proposed Facilities			Committee Recommended Facilities			Δ Costs (\$1,000)*	Comments/Other Uses	Basin Project Rank	Overall Project Rank
		Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*	Structural or Non-Structural	Structure (Size/Type)	Estimated Cost (\$1,000)*				
F.E. Warren Air Force Base		S	Detention and conveyance				12,000	12,000	Existing undersized storm sewers. Project originally proposed in 1988 Capitol Basin Drainage Master Plan. The U.S. Army Corps of Engineers revised the plan with analysis and design in 2005. Phase 1 was constructed. The rest of the project needs to be funded and constructed	High	High
			Total				12,000	12,000			

*Costs inflated from 2004 dollars assumes an inflation factor of 1.2

37. Continue to Implement Sound Floodplain Management Practices through Participation in the National Flood Insurance Program in the City of Cheyenne

Hazards Addressed Flood

Project Description and Background The City of Cheyenne participates in the National Flood Insurance Program. This project restates the commitment of the City of Cheyenne to implement sound floodplain management practices, as stated in the flood damage prevention ordinance. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development is elevated to or above the base flood elevation. Floodplain managers will remain current on NFIP policies, and are encouraged to attend appropriate training.

This project also includes periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and adequately addresses the level of flood risk identified within the Hazard Mitigation Plan.

Other activities that could be included in this effort are:

- Ensure that stop work orders and other means of compliance are being used as authorized by each ordinance;
- Suggest changes to improve enforcement of and compliance with regulations and programs;
- Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;
- Utilize Digital Flood Insurance Rate maps in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits;
- Promote and disperse information on the benefits of flood insurance, with assistance from partners such as the Wyoming Office of Homeland Security.
- Continue to participate in the Community Rating System to further lower the cost of flood insurance for residents

Other Alternatives No action

Jurisdiction	City of Cheyenne
Responsible Office	City of Cheyenne Engineering Department
Priority	Low
Cost Estimate	Low
Benefits	Reduced property loss from floods; continued availability of flood insurance for residents; reduced vulnerability of new development to flooding
Potential Funding	Covered in existing budget
Schedule	Ongoing

38. Adoption of Mutual Aid Agreements/Participation in WYOWARN

Hazards Addressed Multiple

Project Description and Background Water and Wastewater Agency Response Network (WYOWARN) is a common, statewide mutual aid and assistance agreement for water and wastewater utilities. As of July 2012, 17 communities in Wyoming have signed the agreement including 4 from Laramie County. Continued and expanded participation in this network will improve mutual aid capabilities during a disaster.

Other Alternatives None identified

Jurisdiction Laramie County

Responsible Office Board of Public Utilities

Priority Medium

Cost Estimate \$1,000

Benefits Enhancement of response capabilities for water and wastewater utilities during disasters

Potential Funding TBD

Schedule Agreement completed. Recruiting and maintaining the network of participating communities is ongoing.

39. Development of Hydroelectric Power Generation

Hazards Addressed	Multiple
Project Description and Background	Hydroelectric power generation is needed at the water treatment plant to decrease potential for power loss in the event of severe storms and reduce reliance on external sources of power.
Other Alternatives	None identified
Jurisdiction	Laramie County
Responsible Office	Board of Public Utilities
Priority	Low
Cost Estimate	Unknown
Benefits	Decreased operating costs and reliance on external power sources; reduced disruption costs during power outages.
Potential Funding	TBD
Schedule	TBD

Appendix B. PLANNING PROCESS DOCUMENTATION

A data collection guide was used to collect hazard, risk and capabilities information from Laramie County, the City of Cheyenne, the Town of Albin, the Town of Burns, and the Town of Pine Bluffs which was then integrated into this plan. The data collection guide template is provided here, along with other materials that serve as documentation of the planning process.

**Local Hazard Mitigation Plan Update
Data Collection Guide
for
Laramie County and the City of Cheyenne, Wyoming
Hazard Mitigation Planning Committee (HMPC)
Prepared by
AMEC Environment and Infrastructure, Inc.
February 2012**



Overview

The contents of this workbook have been designed to assist Laramie County and the City of Cheyenne in collecting necessary background information to support the hazard mitigation planning process pursuant to the Federal Disaster Mitigation Act (DMA) of 2000. This includes a hazard identification and vulnerability assessment, an assessment of Laramie County and Cheyenne's current hazard mitigation capabilities, and an identification of potential mitigation projects that, if undertaken, could prevent or reduce future losses.

The essential information needed to support the planning process includes background information about Laramie County and Cheyenne; plans, technical studies, and data related to hazards and risks; current governing codes, ordinances, regulations, and procedures whose intent is to minimize future losses; and an assessment of the planning area's technical and organizational capabilities to perform hazard mitigation/loss prevention functions. It is important that the plan shows what Laramie County and Cheyenne are doing now to limit future disaster losses.

The planning process is heavily dependent on existing data to be supplied by each of the participants represented on the Hazard Mitigation Planning Committee (HMPC). The DMA plan development process does not require the development of new data, but requires *existing data only*.

The goal of this process is to produce a hazard mitigation plan that meets Laramie County and the City of Cheyenne's needs, as well as the requirements of DMA 2000 and that contains a list of updated projects that may be eligible for streamlined federal mitigation funding pre or post disaster.

What is Mitigation?

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of \$4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2005).

Mitigation generally means reducing long-term risk from hazards to acceptable levels through predetermined measures accompanying physical development, for example: strengthening structures to withstand high winds or snow loads; elevating, removing or limiting development in flood-prone areas; clearing defensible space around residences in Wildfire Urban Interface (WUI) areas; or designing development away from areas of geological instability.

Mitigation is different from emergency preparedness or response. Preparedness concentrates on activities which make a person, place, or organization ready to respond to a disaster with emergency equipment, food, emergency shelter, and medicine. Response activities may reduce damages, such as sandbagging during a flood, but this is a short term solution and requires advance warning and capabilities in place during the event. Mitigation of flood hazards through wise floodplain management is a long term solution.

Participation

The DMA planning regulations and guidance stress that each entity seeking the required FEMA approval of their mitigation plan must:

- Participate in the process;
- Detail areas within the planning area where the risk differs from that facing the entire area;
- Identify specific projects to be eligible for funding; and
- Have the governing board formally adopt the plan.

For HMPC members, 'participation' means the planning committee representatives will:

- Attend and participate in HMPC meetings;
- Provide available data that is requested of the HMPC coordinator;
- Review and provide/coordinate comments on the draft plans;
- Advertise, coordinate and participate in the public input process; and
- Coordinate the formal adoption of the plan by the governing board.

Data Collection Guide

This guide contains an explanation of the types of hazard mitigation/loss prevention data that is needed for the hazard mitigation planning process. This guide identifies specific requirements for the Risk Assessment Process, which includes the Hazard Identification, Vulnerability, and Capability Assessments as well as defines requirements for development of the Mitigation Strategy.

The worksheets have been developed to assist with the data collection. These need to be completed for each participating jurisdiction (one for each county, town, city, or special district) that desires credit for participation in the 2012 update. The guide will serve two purposes:

- They will help facilitate the collection of the necessary information.
- They will function as evidence of "participation" in the planning process.

Each jurisdiction should utilize members of their planning subcommittee to complete this form.

Data collection guides are due on MARCH 30TH to Jeff Brislawn (contact information below).

Project Reference

Laramie County Point of Contact:

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The Risk Assessment Process

The risk assessment process includes three components: hazard identification, vulnerability assessment, and capability assessment. Data needs and worksheets for each of the risk assessment components are included in this guide.

Laramie County/City of Cheyenne Local Hazard Mitigation Plan Worksheet #1: Hazard Identification Update

Name of Department/Jurisdiction: _____

Use this worksheet to identify possible hazards that may impact your jurisdiction. Hazards currently identified in the plan are listed. List others that may not be represented, where appropriate. Please rank according to the guidelines that follow the table. Use copies of Worksheet #2: Historic Hazard Event to provide evidence to justify your conclusions.

Hazard	Frequency of Occurrence	Spatial Extent	Potential Magnitude	Significance	Hazard Map? (Paper/GIS/Source)
Avalanche					
Dam & Levee Failure					
Drought					
Earthquake					
Expansive Soil					
Extreme Cold					
Extreme Heat					
Flood					
Hailstorm					
Hazardous Materials					
Landslide					
Land Subsidence					
Lightning					
Tornado					
Wildland fires					
Windstorm					
Winter Storm and Blizzards					

Frequency of Occurrence:
 Highly Likely: Near 100% probability in next year.
 Likely: Between 10 and 100% probability in next year or at least one chance in ten years.
 Occasional: Between 1 and 10% probability in next year or at least one chance in next 100 years.
 Unlikely: Less than 1% probability in next 100 years.

Spatial Extent:
 Limited: Less than 10% of planning area
 Significant: 10-50% of planning area
 Extensive: 50-100% of planning area

Potential Magnitude:
 Catastrophic: Multiple deaths, complete shutdown of facilities for 30 days or more, more than 50% of property is severely damaged
 Critical: Multiple severe injuries, complete shutdown of facilities for at least 2 weeks, more than 25% of property is severely damaged
 Limited: Some injuries, complete shutdown of critical facilities for more than one week, more than 10 percent of property is severely damaged
 Negligible: Minor injuries, minimal quality-of-life impact, shutdown of critical facilities and services for 24 hours or less, less than 10 percent of property is severely damaged.
Significance (your subjective opinion): Low, Medium, High

Prepared by: _____

Phone: _____

Email: _____

Please return worksheets by mail, email, or fax to:
 Jeff Brislawn, AMEC Environment & Infrastructure
 1002 Walnut St., Suite 200
 Boulder, CO 80302
 Fax (303) 422-0616 Phone (303) 820-4654
 Email: Jeff.brislawn@amec.com



Laramie County/City of Cheyenne Local Hazard Mitigation Plan Worksheet #2: Historic Hazard Event

Name of Department/Jurisdiction: _____

Please fill out one sheet for each significant hazard event with as much detail as possible. Attach supporting documentation, photocopies of newspaper articles, or other original sources.

Type of event	
Nature and magnitude of event	
Location	
Date of event	
Injuries	
Deaths	
Property damage	
Infrastructure damage	
Crop damage	
Business/economic impacts	
Road/school/other closures	
Other damage	
Insured losses	
Federal/state disaster relief funding	
Opinion on likelihood of occurring again	
Source of information	
Comments	

Prepared by: _____

Phone: _____

Email: _____

Please return worksheets by mail, email, or fax to:
 Jeff Bislawn, AMEC Environment & Infrastructure
 1002 Walnut St., Suite 200
 Boulder, CO 80302
 Fax (303) 422-0616 Phone (303) 820-4654
 Email: Jeff.bislawn@amec.com



Laramie County/City of Cheyenne Local Hazard Mitigation Plan Worksheet #3: Vulnerability Assessment

Name of Department/Jurisdiction: _____

The purpose of this worksheet is to assess the vulnerable buildings, populations, critical facilities, infrastructure, and other important assets in your community by using the best available data to complete the table and questions that follow. Use the table on the next page to compile a detailed inventory of specific assets at risk including critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets as defined below. These may include hospitals, fire stations, or historic buildings. Attach supporting documentation, such as photographs, reports, or plans if possible. In the hazard specific column of the asset inventory table, indicate if there is a specific hazard to which the asset is at risk.

Critical Facilities

FEMA generally defines four kinds of critical facilities:

- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials
- Hospitals, nursing homes, and housing likely to have occupants who may not be sufficiently mobile to avoid injury or death during a hazard event
- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for emergency response activities before, during, and after a hazard event
- Public and private utility facilities that are vital to maintaining or restoring normal services to hazard areas before, during, and after a hazard event

FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets. 'Essential facilities' are those that, if damaged, would have devastating impacts on disaster response and/or recovery. 'High potential loss facilities' are those that would have a high loss or impact on the community. Transportation and lifeline facilities are third category of critical assets; examples are provided below.

Essential Facilities	High Potential Loss Facilities	Transportation and Lifeline
<ul style="list-style-type: none"> - Hospitals and other medical facilities - Police stations - Fire station - Emergency Operations Centers 	<ul style="list-style-type: none"> - Power plants - Dams/levees - Military installations - Hazardous material sites - Schools - Shelters - Day care centers - Nursing homes - Main government buildings 	<ul style="list-style-type: none"> - Highways, bridges, and tunnels - Railroads and facilities - Bus facilities - Airports - Water treatment facilities - Natural gas facilities and pipelines - Oil facilities and pipelines - Communications facilities

Additional Vulnerability Questions

<p>Number of repetitive loss properties (flooding)</p>	
<p>Average depth of 100-year floodplain</p>	
<p>Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, or low-income.</p>	
<p>Describe growth and development trends and future growth areas and how they relate to hazard areas and vulnerability concerns/issues.</p>	
<p>Review Table 13.1 in the 2005 Cheyenne Hazard Mitigation Plan and the table on page 99 of the 2005 Laramie County Hazard Mitigation Plan. Indicate what projects have been completed or are ongoing and describe how vulnerability has changed (or not) as a result of implementing successful mitigation actions.</p>	

Prepared by: _____
 Phone: _____
 Email: _____

Please return worksheets by mail, email, or fax to:
 Jeff Bristlawn, AMEC Environment & Infrastructure
 1002 Walnut St., Suite 200
 Boulder, CO 80302
 Fax (303) 422-0616 Phone (303) 820-4654
 Email: Jeff.bristlawn@amec.com



Laramie County/City of Cheyenne Local Hazard Mitigation Plan Worksheet #4: Capability Assessment

Name of Department/Jurisdiction: _____

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete this worksheet and provide supporting documentation if possible.

Regulatory

The following planning and land management tools are typically used by local jurisdictions to implement hazard mitigation activities. Please indicate which your jurisdiction has in place. If your jurisdiction does not have this capability or authority, please indicate if a higher level of government has the authority. Also use the comments column to indicate how we can obtain a copy of the plan or document (i.e. available on the web (include address), will put on ftp, will e-mail or mail, will fax).

Regulatory Tool (ordinances, codes, plans)	Yes/No	Comments
General or Comprehensive plan		
Zoning ordinance		
Subdivision ordinance		
Growth management ordinance		
Floodplain ordinance		
Other special purpose ordinance (stormwater, steep slope, wildfire)		
Building code		
Fire department ISO rating		
Erosion or sediment control program		
Stormwater management program		
Site plan review requirements		
Capital improvements plan		
Economic development plan		
Local emergency operations plan		
Other special plans		
Flood insurance study or other engineering study for streams		
Elevation certificates (for floodplain development)		
Other		

Administrative/Technical

Identify the technical and personnel resources responsible for activities related to hazard mitigation/loss prevention within your jurisdiction. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level government that can provide technical assistance, please indicate so in the comments column.

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices			
Engineer/professional trained in construction practices related to buildings and/or infrastructure			
Planner/engineer/scientist with an understanding of natural hazards			
Personnel skilled in GIS			
Full time building official			
Floodplain manager			
Emergency manager			
Grant writer			
Other personnel			
GIS Data Resources (Hazard areas, critical facilities, land use, building footprints, etc.)			
Warning Systems/Services (Reverse 9-11, cable override, outdoor warning signals)			
Other			

Additional Capabilities Questions

<p>Does your community have any hazard-related certifications, such as Storm Ready certification or Firewise Communities certification?</p>	
<p>Describe any past or ongoing public education or information programs, such as for responsible water use, earthquake or fire safety, household preparedness, or environmental education.</p>	
<p>Describe any other past or ongoing projects or programs designed to reduce disaster losses. These may include projects to protect critical facilities.</p>	

Prepared by: _____
 Phone: _____
 Email: _____

Please return worksheets by mail, email, or fax to:
Jeff Brislaw, AMEC Environment & Infrastructure
 1002 Walnut St., Suite 200
 Boulder, CO 80302
 Fax (303) 422-0616 Phone (303) 820-4654
 Email: Jeff.brislaw@amec.com

The Board of
Laramie County
Commissioners



Jeff Ketcham *Diane Humphrey*
Chairman *Vice-Chairman*

Gay Woodhouse
Commissioner

October 26, 2010

Joe Moore, Director
Wyoming Office of Homeland Security
122 West 25th Street
First Floor East
Cheyenne, WY 82002

RE: Letter of intent

As a participating jurisdiction in the Laramie County, Town of Albin, Town of Burns and Town of Pine Bluffs Multi-Jurisdictional Hazard Mitigation Plan

Dear Mr. Moore:

In 2005 FEMA approved the Laramie County Hazard Mitigation Plan. As you are aware the plan must be reviewed and revised every 5 years. It is the intent of Laramie County to apply for fiscal year 2010 PDM planning funds to up-date the county's existing plan and again achieve a FEMA compliant and approved Multi-Hazard Mitigation Plan under 44 CFR § 201.6 standards.

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, municipal, or jurisdictional level, Laramie County is submitting this letter of commitment to confirm Laramie County has agreed to participate in the Laramie County Multi-jurisdictional Hazard Mitigation Planning. We have attached "Letters of Commitment" from the Towns of Albin, Wyoming, Burns, Wyoming and Pine Bluffs, Wyoming, stating they will be involved in the revision and updating process.

Further, as a condition to participating in the mitigation planning, Laramie County agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to complete the plan in conformance with FEMA requirements.

310 West 19 Street, Suite 300
Cheyenne, WY 82001
TEL. (307) 633-4260 FAX (307) 633-4267
commissioners@laramiecounty.com * www.laramiecounty.com

Laramie County understands it must engage in the following planning process, as more fully described in FEMA's Local Multi-Hazard Mitigation Planning Guidance dated July 1, 2008, including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and
- Formal adoption of the Multi-jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

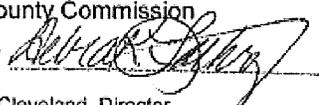
Laramie County understands the grant is a 75% grant and Laramie County will provide a 25% match for any grant funds received. All transactions will be fully documented and submitted to the Wyoming Office of Homeland Security, along with any reimbursement requests.

The grant application is being submitted on FEMA's e-grants system at <https://portal.fema.gov>. All other required documents have been submitted to WOHS.

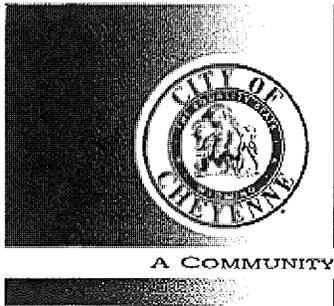
Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi jurisdictional plan, I, Jeff Ketchum, Chairman of the Board of County Commissioner of Laramie County, Wyoming, commit Laramie County to the Laramie County Multi-jurisdictional Hazard Mitigation Planning effort.



Jeff Ketchum, Chairman
Laramie County Commission

AFFECTED BY 

Cc: Rob Cleveland, Director
Emergency Management



OFFICE OF THE MAYOR
2101 O'Neil Avenue - #310
Cheyenne WY 82001
(307) 637-6300
(307) 637-6378 FAX
mayor@cheyennecity.org

July 29, 2011

Rob Cleveland, Director
Cheyenne/Laramie County Emergency Management Agency
310 West 19th Street, Suite 410
Cheyenne, Wyoming 82001

Re: Letter of intent as a participating jurisdiction in the Laramie County, Town of Albin, Town of Burns, Town of Pine Bluffs and the City of Cheyenne Multi-jurisdictional Hazard Mitigation Plan.

Dear Mr. Cleveland:

The Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans. Such a plan addresses issues that are better resolved by evaluating hazards more comprehensively by coordinating at the city, county, regional, or watershed level, the City of Cheyenne is submitting this letter to confirm its intent to participate in the Multi-jurisdictional Hazard Mitigation Plan.

Further, as a condition to participating in the mitigation planning, the City of Cheyenne agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary, and in a timely manner to Laramie County to complete the plan in conformance with FEMA requirements.

The City of Cheyenne understands that it must engage in the following planning process, as more fully described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008 including, but not limited to:

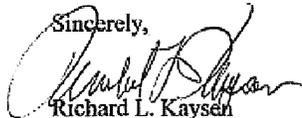
- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified which are specific for each jurisdiction;

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- Demonstration that there has been pro actively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the objectives incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan, the City of Cheyenne restates its intent to participate in the Multi-jurisdictional Hazard Mitigation Plan.

Sincerely,



Richard L. Kaysen
Mayor

cc: Doug Vetter



*Bill Cushing, Council Member
Alan Curtis, Council Member*

William Shain, Mayor

*Michael Ragsdale, Council Member
Mark Fornstrom, Council Member*

October 18, 2010

Mr. Rob Cleveland
Cheyenne/Laramie County Emergency Management Agency
310 West 19th Street, Suite 410
Cheyenne, WY 82001

Re: Letter of Commitment as a participating jurisdiction in the Laramie County, Town of Albin, Town of Burns and Town of Pine Bluffs Multi-jurisdictional Hazard Mitigation Plan.

Dear Mr. Cleveland:

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Town of Pine Bluffs is submitting this letter of commitment to confirm that the governing body of Pine Bluffs, Wyoming has agreed to participate in the Laramie County Multi-jurisdictional Hazard Mitigation Plan.

Further, as a condition to participating in the mitigation planning; the Town of Pine Bluffs agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Laramie County to complete the plan in conformance with FEMA requirements.

The Town of Pine Bluffs understands that it must engage in the following planning process, as more fully described in FEMA's Local Multi-Hazard Mitigation Planning Guidance dated July 1, 2008 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction. ;

Pine Bluffs
The Frontier Crossroads

- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi jurisdictional plan; I Mayor William Shain, commits the Town of Pine Bluffs to the Laramie County, Town of Albin, Town of Burns and Town of Pine Bluffs Multi-jurisdictional Hazard Mitigation Planning effort.

Dated this 18th day of October, 2010.

William Shain, Mayor



ATTEST:



Cate Cundall, Clerk/Treasurer

October 15th, 2010

Mr. Rob Cleveland
Cheyenne / Laramie County
Emergency Management Agency
310 West 19th Street, Suite 410
Cheyenne, WY 82001



Re: Letter of Commitment as a participating jurisdiction in the Laramie County, Town of Albin, Town of Burns and Town of Pine Bluffs Multi-jurisdictional Hazard Mitigation Plan.

Dear Mr. Cleveland,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Town of Burns is submitting this letter of commitment to confirm that the governing body of Burns, Wyoming has agreed to participate in the Laramie County Multi-jurisdictional Hazard Mitigation Plan.

Further, as a condition to participating in the mitigation planning; the Town of Burns agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Laramie County to complete the plan in conformance with FEMA requirements.

The Town of Burns understands that it must engage in the following planning process, as more fully described in FEMA's Local Multi-Hazard Mitigation Planning Guidance dated July 1, 2008 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction. ;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and

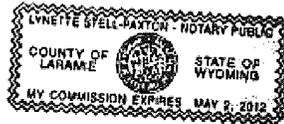
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi jurisdictional plan; I Mayor Oakes, commit the Town of Burns to the Laramie County, Town of Albin, Town of Burns and Town of Pine Bluffs Multi-jurisdictional Hazard Mitigation Planning effort.

Executed this 15th day of October, 2010



Phillip Oakes, Mayor
P.O. Box 32
Burns, WY 82053


Attested

Faxed 10/29/10

TOWN OF ALBIN

PO BOX 188
ALBIN WYOMING 82050

PHONE 307-246-3386
Fax: 307-246-3299
Email: albincenter@aof.com
Website: www.albinwyo.com



October 28, 2010

Mr. Rob Cleveland
Cheyenne/Laramie County Emergency Management Agency
310 West 19th Street, Suite 410
Cheyenne, WY 82001

Re: Letter of commitment as a participating jurisdiction in the Laramie County, Town of Albin, Town of Burns and Town of Pine Bluffs Multi-jurisdictional Hazard Mitigation Plan.

Dear Mr. Cleveland,

As the Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR § 201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans and that many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level, the Town of Albin is submitting this letter of commitment to confirm that the governing body of Albin, Wyoming has agreed to participate in the Laramie County Multi-jurisdictional Hazard Mitigation Plan.

Further, as a condition to participating in the mitigation planning, the Town of Albin agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary and in a timely manner to Laramie County to complete the plan in conformance with FEMA requirements.

The Town of Albin understands that it must engage in the following planning process, as more fully described in FEMA's Local Multi-Hazard Mitigation Planning Guidance dated July 1, 2008 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified specific for each jurisdiction;
- Demonstration that there has been proactively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.); and
- Documentation of an effective process to maintain and implement the plan; and,
- Formal adoption of the Multi-jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the obligations incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan; I Mayor Krakow, commit the Town of Albin to the Laramie County, Town of Albin, Town of Burns, and Town of Pine Bluffs Multi-jurisdictional Hazard Mitigation Planning effort.

Executed this 29th day of October, 2010



Kelly Krakow, Mayor
PO Box 188
Albin, WY 82050



Attested



OFFICE OF THE MAYOR
2101 O'Neil Avenue - #310
Cheyenne WY 82001
(307) 637-6300
(307) 637-6378 FAX
mayor@cheyennecity.org

July 29, 2011

Rob Cleveland, Director
Cheyenne/Laramie County Emergency Management Agency
310 West 19th Street, Suite 410
Cheyenne, Wyoming 82001

Re: Letter of intent as a participating jurisdiction in the Laramie County, Town of Albin, Town of Burns, Town of Pine Bluffs and the City of Cheyenne Multi-jurisdictional Hazard Mitigation Plan.

Dear Mr. Cleveland:

The Federal Emergency Management Agency's (FEMA) Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans. Such a plan addresses issues that are better resolved by evaluating hazards more comprehensively by coordinating at the city, county, regional, or watershed level, the City of Cheyenne is submitting this letter to confirm its intent to participate in the Multi-jurisdictional Hazard Mitigation Plan.

Further, as a condition to participating in the mitigation planning, the City of Cheyenne agrees to meet the requirements for mitigation plans identified in 44 CFR §201.6 and to provide such cooperation as is necessary, and in a timely manner to Laramie County to complete the plan in conformance with FEMA requirements.

The City of Cheyenne understands that it must engage in the following planning process, as more fully described in FEMA's *Local Multi-Hazard Mitigation Planning Guidance* dated July 1, 2008 including, but not limited to:

- Identification of hazards unique to the jurisdiction and not addressed in the master planning document;
- The conduct of a vulnerability analysis and an identification of risks, where they differ from the general planning area;
- The formulation of mitigation goals responsive to public input and development of mitigation actions complementary to those goals. A range of actions must be identified which are specific for each jurisdiction;

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- Demonstration that there has been pro actively offered an opportunity for participation in the planning process by all community stakeholders (examples of participation include relevant involvement in any planning process, attending meetings, contributing research, data, or other information, commenting on drafts of the plan, etc.);
- Documentation of an effective process to maintain and implement the plan;
- Formal adoption of the Multi-jurisdictional Hazard Mitigation Plan by the jurisdiction's governing body (each jurisdiction must officially adopt the plan).

Therefore, with a full understanding of the objectives incurred by participating in the FEMA hazard mitigation planning process as a participant in a multi-jurisdictional plan, the City of Cheyenne restates its intent to participate in the Multi-jurisdictional Hazard Mitigation Plan.

Sincerely,

Richard L. Kaysan
Mayor

cc: Doug Vetter

Approved as to
form only:

P. W. W. W.
Date: 8/16/2011

RESOLUTION NO. 5310

ENTITLEMENT: "A RESOLUTION AUTHORIZING THE CITY OF CHEYENNE, A JURISDICTION WITHIN LARAMIE COUNTY, WYOMING, TO PARTICIPATE IN A MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN."

WITNESSETH

WHEREAS, the regulations of the Federal Emergency Management Agency (FEMA), 44 CFR §201.6, set forth criteria for the creation of Multi-jurisdictional Hazard Mitigation Plans and said regulations recommend the creation of such plans to evaluate, address and resolve hazards through comprehensive and coordinated planning at the city, county, regional, and watershed levels; and

WHEREAS, a Multi-jurisdictional Hazard Mitigation Plan memorializes the commitment of each of the participating jurisdictions to reduce risks from natural hazards, serves as a guide for the expenditure of public funds and resources to reduce the effects of natural hazards, provides a vehicle for the expenditure of State funds and resources to provide technical assistance, and provides a method to prioritize project funding; and

WHEREAS, this new Plan shall replace the previous hazard and flood mitigation plans adopted through Resolutions # 4691 and # 4699 that have since expired; and

WHEREAS, the City of Cheyenne must have an approved Multi-jurisdictional Hazard Mitigation Plan under 44 CFR §201.6 to be eligible to apply for and receive hazard mitigation project grants; and

WHEREAS, the City of Cheyenne agrees to meet the requirements for a Multi-jurisdictional Hazard Mitigation Plan identified in 44 CFR §201.6 and to provide timely and necessary cooperation to Laramie County to complete the plan in conformance with FEMA requirements; and

WHEREAS, the Mayor of the City of Cheyenne should be authorized to expend funds to pay the County of Laramie, Wyoming, the City's proportionate share of the costs of preparation of a Multi-jurisdictional Hazard Mitigation Plan up to an amount not to exceed \$54,150.00.

NOW, THEREFORE, BE IT RESOLVED BY THE GOVERNING BODY OF THE CITY OF CHEYENNE, that the Mayor of the City of Cheyenne is authorized to engage in the required planning process as a participating jurisdiction in Laramie County, Wyoming, necessary for the development of an approved Multi-jurisdictional Hazard Mitigation Plan, and is further authorized to pay the City's proportionate share of reasonable and necessary costs incurred in the development of the plan in an amount not to exceed \$54,150.00.

BE IT FURTHER RESOLVED that the Mayor of the City of Cheyenne, is authorized to sign a letter of intent as a participating jurisdiction.

PASSED, APPROVED AND ADOPTED THIS 12th day of September, 2011.

By: Dr. Mark D. Rinne
~~XXXXXXXXXXXXXXXXXXXX~~
Dr. Mark D. Rinne, Acting Mayor

ATTEST:

Carol Intiekofér
Carol Intiekofér, City Clerk

CERTIFICATE

I, Carol Intlekofer, hereby certify that the foregoing Resolution was adopted by the City of Cheyenne at a City Council meeting held on September 12th, 2011, and that the meeting was held accordingly to law; and that said Resolution has been duly entered in the public record of the City of Cheyenne.

Carol Intlekofer
Carol Intlekofer
Cheyenne City Clerk

Laramie County
Mitigation Planning Meeting
October 12, 2010
Meeting Minutes

Attendees:

Rob Cleveland, LCEMA
Bill McHenry, LCEMA
Jeanine West, LCEMA
Tom McDonough, Pine Bluffs
Kim Johnson, WOHS
Judy Johnstone, Burns
Bob Anderson, Albin

The meeting was held in the Laramie County Emergency Management office. It began at 10:05am and adjourned at 11:30am.

Rob began the meeting by welcoming everyone for coming and had everyone introduce themselves. He then spoke about the history behind the Laramie County Mitigation Plan and how the current plan is separate from the City of Cheyenne. At this time he has invited the City to the meeting and to combine the two plans but he has not received any response from them. Rob advised the group that the current County plan is expired and in order for us to request funding for flood mitigation or any mitigation projects, this needs to be updated.

Next, Rob asked Kim Johnson to discuss the Hazard Mitigation Grant Program. Kim advised the group of the purpose behind the grant and what it covers. Rob advised the group that he would like to use this grant to hire a consultant to review the current plan and update it. The group agreed that this would work best for everyone.

Next, Jeanine spoke to the group about the process to get the grant application complete and how important it is that everyone participates. She stated that a letter of Intent/Commitment must be completed and asked Kim if each town had to complete that or if one letter can be done for the entire county. Next, she stated that each town needs to discuss with their council and city officials the current and historic hazardous events that have

occurred in their area. This information needs to be provided for the new mitigation plan.

Kim spoke to the group more about the process and other counties that have participated in this grant. He gave Jeanine the names of the counties and consulting firms that have worked with this before.

Jeanine gave a recap of tasks that need to be completed by the next meeting on Tuesday November 9, 2010 at 10am in the EMA office.

Tasks:

1. **Letter of Commitment** – Each town must return a letter of commitment to the EMA office. EMA will write a letter of Intent for the 25% portion of the grant and have it approved by the Commissioners.
2. Each town needs to begin reviewing current and historic hazards in their area that need to be included. The following information needs to be collected for the hazard:
 - a. Location
 - b. History of hazard including the cost history from previous events.
 - c. Extent of hazard (magnitude/severity)
 - d. Probability of the recurrence.

Laramie County
Mitigation Planning Meeting
November 22, 2010
Meeting Minutes

On Monday November 22, 2010 at 6pm, Sandra Newland, Laramie County Grants Manager, and Jeanine West, Laramie County EMA Executive Assistant, attended the Burns Town meeting to discuss the Hazard Mitigation Grant. The meeting was held at the Burns Town Hall.

They advised the Town Council of the grant application that was put in to FEMA on November 19, 2010 to request funding for the hiring of a consultant to update the county mitigation plan. Additionally they advised the Council that once the mitigation plan is updated they will have the ability to request funding for hazards that were mitigated.

Both Sandra and Jeanine also spoke to the Council about the types of hazards that need to be mitigated and asked for their assistance to ensure that all current/potential hazards in the Burns area are being looked at and addressed in the mitigation plan.

Laramie County
Mitigation Planning Meeting
December 9, 2010
Meeting Minutes

On Thursday December 9, 2010 at 6pm, Sandra Newland, Laramie County Grants Manager, and Jeanine West, Laramie County EMA Executive Assistant, attended the Albin Town Council meeting to discuss the Hazard Mitigation Grant. The meeting was held at the Albin Community Center.

They advised the Town Council of the grant application that was put in to FEMA on November 19, 2010 to request funding for the hiring of a consultant to update the county mitigation plan. Additionally they advised the Council that once the mitigation plan is updated they will have the ability to request funding for hazards that were mitigated.

Both Sandra and Jeanine also spoke to the Council about the types of hazards that need to be mitigated and asked for their assistance to ensure that all current/potential hazards in the Albin area are being looked at and addressed in the mitigation plan. Jeanine handed out information on guidelines for the Mitigation Strategy to help Albin determine the hazards in their area.

Laramie County
Mitigation Planning Meeting
December 20, 2010
Meeting Minutes

On Monday December 20, 2010 at 7pm, Sandra Newland, Laramie County Grants Manager, and Jeanine West, Laramie County EMA Executive Assistant, attended the Pine Bluffs Town Council meeting to discuss the Hazard Mitigation Grant. The meeting was held at the Pine Bluffs Town Hall.

They advised the Town Council of the grant application that was put in to FEMA on November 19, 2010 to request funding for the hiring of a consultant to update the county mitigation plan. Additionally they advised the Council that once the mitigation plan is updated they will have the ability to request funding for hazards that were mitigated.

Both Sandra and Jeanine also spoke to the Council about the types of hazards that need to be mitigated and asked for their assistance to ensure that all current/potential hazards in the Pine Bluffs area are being looked at and addressed in the mitigation plan. Jeanine handed out information on guidelines for the Mitigation Strategy to help Pine Bluffs determine the hazards in their area.

Laramie County
Mitigation Planning Meeting
January 12, 2011
Meeting Minutes

On Wednesday January 12, 2011 at 7pm, Sandra Newland, Laramie County Grants Manager, and Jeanine West, Laramie County EMA Executive Assistant, attended the Laramie County Fire Chief's Association meeting in Carpenter to discuss the Hazard Mitigation Grant.

They advised the Chief's of the grant application that was put in to FEMA on November 19, 2010 to request funding for the hiring of a consultant to update the county mitigation plan. Additionally they advised the Chief's that once the mitigation plan is updated they will have the ability to request funding for hazards that were mitigated.

Both Sandra and Jeanine also spoke to the Chief's about the types of hazards that need to be mitigated and asked for their assistance to ensure that all current/potential hazards in Laramie County area are being looked at and addressed in the mitigation plan. Jeanine handed out information on guidelines for the Mitigation Strategy to help the Chief's determine the hazards in their area which will assist them in the future to apply for funding to help mitigate these hazards.

Laramie County
Mitigation Planning Meeting
January 20, 2011
Meeting Minutes

On Thursday January 20, 2011 at 9am, Sandra Newland, Laramie County Grants Manager, and Jeanine West, Laramie County EMA Executive Assistant, met with Done Beard, Director, Laramie County Public Works, to discuss the Hazard Mitigation Grant. The meeting was held at the Laramie County Public Works office.

They advised Mr. Beard of the grant application that was put in to FEMA on November 19, 2010 to request funding for the hiring of a consultant to update the county mitigation plan. Additionally they advised him that once the mitigation plan is updated they will have the ability to request funding for hazards that were mitigated.

Both Sandra and Jeanine also spoke to him about the types of hazards that need to be mitigated and asked for his assistance to ensure that all current/potential hazards in Laramie County are being looked at and addressed in the mitigation plan. Jeanine handed out information on guidelines for the Mitigation Strategy to help him determine the hazards he may see in the county.

Laramie County
Mitigation Planning Meeting
February 15, 2011

Agenda

1. Grant Update
2. Mitigation Plan Updates
 - a. Albin
 - b. Burns
 - c. Pine Bluffs
 - d. Fire Districts
 - e. Laramie County
3. Questions and Concerns
4. Other

Laramie County
Mitigation Planning Meeting
February 15, 2011
Meeting Minutes

Attendees:

Rob Cleveland, LCEMA
Bill McHenry, LCEMA
Jeanine West, LCEMA
Tom McDonough, Pine Bluffs
Bob Anderson, Albin
Charlie Vosler, Burns
Sandra Newland, LC Grants
Don Beard, LC Public Works

The meeting was held in the Laramie County Emergency Management office. It began at 10:00am and adjourned at 11:10am.

Jeanine began the meeting by welcoming everyone for coming and gave them an update on the grant request to FEMA for funds to hire a consultant for the plan update. She advised the group that on November 9, 2010, Sandra Newland and her submitted the grant request to Homeland Security. Per Homeland Security we should know sometime in March if we receive the grant. Jeanine also spoke to the group about the importance of the plan getting updated as soon as possible due to projects in the area that could use mitigation funds. Until we get the grant and the consultant we will continue with the updating process ourselves in the event that we do not get the grant. Rob also spoke to the group about the importance of the plan update.

Next, Jeanine spoke to the group about how she has been reviewing the current plan. She stated that she will be contacting the Wyoming Department of Agriculture, the National Weather Service, and possibly the Wyoming State Climate Office to start gathering the updated data needed for specific areas of the plan such as severe weather incidents and drought effects on crops.

Next, each town representative spoke about what types of hazards need to be mitigated in their area and some of the projects that may help with these issues.

Albin – Bob spoke about back up generators for their community center and other critical resources. He also spoke about the need for security at their water tower. Fencing is one way to help solve the issue.

Burns – Charlie gave the group a list of possible hazards and natural disasters that occur or may occur in the Burns area. He identified some of the major hazards in the area such as old water and sewer pipes, the need for a new water tower, and flooding issues. See attached notes for complete details.

Pine Bluffs – Tom discussed some of the hazards they have identified such as some flooding issues, a new water tower, and beetle kill in the trees. He also spoke about back up generators or getting a backup resource to provide electricity to their critical resources. He added that their electricity resource is not the same as the other areas in the county; they have one resource and if it breaks they have no backup until it's fixed.

All towns identified the same issues when it comes to the community changes we are seeing in Laramie County with the mineral/oil exploration that's going on. Everyone in the meeting agreed that these are some major concerns in the area. The following are the concerns identified:

Roads – Due to the increase in semi-truck traffic for the oil rigs, the roads will need more maintenance. Don stated that there are roads in the county that will have to be completely re-done due to the traffic increase.

Water – All three towns expressed concerns over the aquifers in their area running out of water and the possibility of contamination of those resources due to the drilling that is going on.

Population increase – With the mineral/oil exploration going on we may start to see an increase in population in the county. With this we will see some potential issues with housing, health services and community development.

Law Enforcement needs - This is due to the increase in traffic and population for all areas of the county.

Next, Rob spoke to the group about the process the county will be going through to hire a consultant. He advised the town representatives that they will be included in the decision.

The group agreed that this meeting went very well and we have had a great start to gathering the information required for the plan update. Jeanine stated that she will notify everyone of the grant award when we receive it and when the RFP goes out. Until then, we will not be having another meeting.

Laramie County
Mitigation Planning Meeting
October 6, 2011
Meeting Minutes

Attendees:

Rob Cleveland, LCEMA
Jeanine West, LCEMA
Sandra Newland, LC Grants
Kelly Krakow, Town of Albin
Jim Elias, City of Cheyenne
Doug Vetter, City of Cheyenne
Jim Martin, City of Cheyenne
Judy Johnstone, Town of Burns
Sam Berta, City of Cheyenne
Don Taylor, Town of Pine Bluffs
Mike Vinson, City of Cheyenne

The meeting was held in the Laramie County Emergency Management office. It began at 2:00pm.

Rob welcomed everyone, thanked them for coming and had everyone introduce themselves. He then spoke to the group about the City coming on board with the project and the changes to the project that needed to be made.

Next, the group reviewed the RFP. They discussed several changes which needed to be made:

1. Change attachment A to the project timeline instead of the project budget. This was changed after the team decided not to advertise how much money was available for the project.
2. Add criteria for judgment and selection process. Jim and Doug from the City stated they would send some examples that the city uses.

The team also discussed the interviewing process for the contractor. It was decided on that the team will have a representative from each jurisdiction be there and each jurisdiction will get one vote. They also decided to advertise the RFP in Cheyenne, Casper, Pine Bluffs, and the Denver Post. The RFP

will run twice in each paper and will need to be back in 3 weeks after the first date it goes out.

Jeanine will be making the necessary changes to the RFP and re-send it to the planning team as soon as she gets the grant award paperwork to compare the rules.

Rob thanked everyone for coming.

Meeting Adjourned.

Hazard Mitigation Planning Team Meeting
December 16, 2011

A meeting was called at 1pm at the Laramie County Emergency Management Office to discuss the five proposals received for the Hazard Mitigation Plan.

Proposals were due to Laramie County on December 1, 2011. The Hazard Mitigation Planning Team met on December 2, 2011 to open and distribute the plans for review. The meeting started off with a discussion on preference for local contractors versus out of state contractors. The team decided that they felt experience was more important in the process than location.

Laramie County:

Jeanne West the representative from Laramie County started off the discussion by listing Laramie County's top two choices. Number one was AMEC out of Boulder, Colorado. The County was impressed with the qualitative and quantitative plans that AMEC has prepared. They have had previous experience in working with Wyoming agencies including multiple jurisdictions. They quoted the project at \$83,248 and had a clear process and included the Gantt chart and STAPLEE approach. They are committed to providing monthly reports. The one concern of the county was the lack of specified dates and times for the steps of the project, but it was assumed this would be further developed with the Gantt chart. Laramie County's second choice was Bold Planning Solutions. Bold had a great timeline and references of previous projects. They were the lowest price and had sufficient mitigation experience. The County had two major concerns with the company in that they are out of the area and are not familiar with Wyoming.

City of Cheyenne:

Doug Vetter from the City of Cheyenne agreed with the County on AMEC being the number one selection due to the overwhelming experience and work within the area. Tetra Tech was their number two choice followed by Bold Planning Solutions.

Pine Bluffs:

Don Taylor the Representative from Pine Bluffs agreed with the County on their top two choices. They selected AMEC as their number one selection followed by Bold Planning Solutions.

Albin:

The town of Albin also selected AMEC as their top selection

Burns:

The town of Burns selected Bold Planning Solutions as the number one choice primarily based on the lowest bid at \$68,750, but agreed with the discussion that AMEC had the best overall experience and qualifications. Burns was impressed with the regional experience in the Mountain West area that AMEC has.

Team Discussion:

The Hazard Mitigation Planning Team had a consensus on the top two contractors that they would like to interview: AMEC and Bold Planning Solutions. Jeanine West with the Laramie County Emergency Management Agency will set up interviews with AMEC and Bold to be held on January 11, 2012.

Each Hazard Mitigation Planning Team member was asked to prepare interview questions and to have these to West no later than January 1, 2012 for compilation.

Contract:

Each team member was provided with a copy of the Contract that will be utilized between Laramie County and the selected Contractor. At this time the contract is in draft version and is a standard template. The contract will include the Scope of Work and Proposal of the selected contractor. The County Commissioners will have the contract before them at their January 17, 2011 meeting.

Those contractors not selected for the project will receive a written notification.

The meeting concluded at 1:25pm.

Laramie County
Mitigation Planning Meeting
March 20, 2012
Meeting Minutes

Attendees:

Jeanine West, LCEMA
Bill McHenry, LCEMA
Charlie Vossler, Burns
Mike Vinson, City of Cheyenne
Chief Jim Martin, City of Cheyenne
Nathan Beauheim, City of Cheyenne
Doug Vetter, City of Cheyenne

The meeting was held in the Burns Town Hall. It began at 10:00am and adjourned at 10:40am.

This meeting was held to collect and discuss the Data Collection Guides AMEC has requested all jurisdictions to fill out. Jeanine answered questions regarding the guides. So far, guides from Burns, the City of Cheyenne, and LCFD#8 have been collected.

Jeanine also handed out the monthly report from AMEC to everyone.

LARAMIE COUNTY/CITY OF CHEYENNE

MULTI-HAZARD MITIGATION PLAN

2012 UPDATE

KICKOFF MEETING and HAZARD IDENTIFICATION UPDATE

Wednesday, February 22nd, 2012

10:00 a.m. to 12:00 p.m.

Laramie County Emergency Management Agency

310 W 19th St, Suite 410

Cheyenne, WY

- ❖ **Introductions**
- ❖ **Mitigation, Mitigation Planning, and the Disaster Mitigation Act Requirements**
- ❖ **The Role of the Hazard Mitigation Planning Committee**
- ❖ **Overview of the existing Multi- Hazard Mitigation Plans**
- ❖ **Objectives and Schedule for the Plan Update**
- ❖ **Review of Identified Hazards**
- ❖ **Implementation Success Stories**
- ❖ **Coordinating with Other Agencies, Related Planning Efforts, and Recent Studies**
- ❖ **Planning for Public Involvement**
- ❖ **Information Needs**
- ❖ **Questions and Answers/Adjourn**

SIGN-IN SHEET
LARAMIE COUNTY AND CITY OF CHEYENNE
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
HMPC #1 – Kickoff Meeting

Wednesday, February 22nd, 2012 @ 10:00am-12:00pm
 Laramie County Emergency Management Agency
 310 W. 19th St., Ste. 410, Cheyenne, WY

Name	Jurisdiction/Organization/Citizen	Title	Phone	E-mail
Charlie V. Voster	Town of Burn's WY.	Fire Marshall	307-286-7996	fvoster@burns.wy.gov
Jeanine West	LC EMA	Exec. Assistant	307-633-7336	jeanine@laramiecounty.com
Rob Cleveland	LC EMA	Director	307-633-7333	rcleveland@laramiecounty.com
Bill McHenry	LC EMA	Deputy Director / Fire Warden	307-633-4335	billmhenry@laramiecounty.com
Jeff Briskman	AMEC	Project Manager	303-820-4654	jeff.briskman@amec.com
Hillary King	AMEC	Jr. Planner	303-820-4662	hillary.king@amec.com
Sandra Newland	LC Grants	Grants Manager	307-633-4201	snewland@laramiecounty.com
James Martin	Chey. Fire	Fire Chief	307-677-6311	martin@cheyenne.wy.gov
Doug Vetter	City Engineering	City Engineer	307-638-4314	dvetter@cheyenne.wy.gov
MIKE VINSON	CHEYENNE ENGINEERING	STAFF ENGINEER		MVINSON@CHEYENNECITY.ORG
Joyce Pukash	Cheyenne/LC GIS Coop	Coop Coordinator	307-633-4314	jpukash@laramiecounty.com
Robert Anderson	Town of Albin	Town Council	307-421-7882	randerson65@albin.wy.gov

Summary of the Laramie County/City of Cheyenne Combined Hazard Mitigation Plan Update Kick-Off Meeting

Wednesday, February 22nd, 2012

10:00am to 12:00pm

Laramie County Emergency Management Agency
310 W. 19th St., Suite 410, Cheyenne, WY

Introductions and Opening Remarks

Jeanine West with Laramie County Emergency Management began the meeting with welcoming remarks and an introduction of Jeff Brislawn and Hillary King from AMEC Environment and Infrastructure, the consulting firm hired to facilitate the planning process and develop the combined, updated City/County plan. Jeff asked everyone around the room to introduce themselves. 10 persons representing a mix of Laramie County/City of Cheyenne agencies and local government representatives from Albin and Burns were present and documented on a sign in sheet. Departments represented at the meeting included the Burns Fire Department, Laramie County Emergency Management Agency, Laramie County Grants, Cheyenne Fire Department, Cheyenne Engineering, Cheyenne/Laramie County GIS Cooperative, and the Albin Town Council. Project team members from AMEC were also present. An agenda and data collection guide were provided as handouts.

Mitigation, Disaster Mitigation Act (DMA) Requirements, and the Planning Process

A PowerPoint presentation was presented by Jeff Brislawn, the project manager from AMEC Environment and Infrastructure. The presentation described the objectives and goals for updating and combining the Laramie County and City of Cheyenne Hazard Mitigation Plans, approved in 2005. Jeff outlined the ten step planning process that will be followed. The 2012 plan is intended to identify hazards, assets at risk, and ways to reduce impacts through long-term, sustainable mitigation projects. The plan will also maintain eligibility for FEMA mitigation grant funding.

Multi-Jurisdictional Participation and the Role of the Hazard Mitigation Planning Committee (HMPC)

Laramie County, the City of Cheyenne, and eligible local governments that participate in the plan will maintain eligibility for FEMA mitigation funds. This meeting is the first meeting of the Laramie County/City of Cheyenne Hazard Mitigation Planning Committee (HMPC) during the update process. A definition of participation in the planning process was provided that includes:

- Attend and participate in HMPC meetings
- Establish/reconvene a local steering committee
- Provide available data requested of the HMPC coordinator/AMEC
- Provide/update hazard profile and vulnerability details specific to jurisdiction

- Develop problem statements, based on risk assessment
- Develop/update local mitigation strategy (action items and progress)
- Advertise and assist with public input process
- Review and comment on plan drafts
- Coordinate formal adoption

It was discussed how each community needs to commit to the above elements to receive credit for participation in the plan update process. Credit leads to eligibility for certain FEMA pre and post disaster grant funding for hazard mitigation projects. In addition all communities must be in good standing with the National Flood Insurance Program to be eligible for FEMA grants. This plan will also be developed to conform to Community Rating System (CRS) planning requirements. This program rewards communities that go above and beyond implementing the minimum National Flood Insurance Policy (NFIP) standards by providing discounts on flood insurance rates. The planning process has the potential to improve the CRS ratings for the City of Cheyenne and Laramie County.

Overview of the 2005 Laramie County Multi Hazard Mitigation Plan and 2005 City of Cheyenne Multi Hazard Mitigation Plan

Rob Cleveland talked about the existing City and County plans originally approved in 2005. Hardcopies and electronic versions of the 2005 plans were provided to AMEC prior to the kickoff meeting. The plans are being updated in accordance with the five year update requirement. The decision was made to combine the City and County plans during this update process. Ultimately, the updated plan will include a County-specific section and annexes for the City of Cheyenne, the town of Albin, the town of Burns, and the town of Pine Bluffs. It was felt that the 2005 City plan included too much information that was not necessarily relevant to the City. The 2012 plan update will be much more concise and focused.

Jeff asked participants about the status of the mitigation action items identified in the two 2005 plans and inquired as to whether any mitigation projects had been successfully implemented. Doug Vettev from City Engineering said that three flood control projects had been completed or were in the remapping process. A possible detention pond project was also being considered. Participants indicated that F.E. Warren Air Force Base, which was not represented at the meeting, was also working on a flood control project. It was suggested they be invited as a stakeholder, since runoff from the base impacts the City of Cheyenne.

Discussion of Objectives and Schedule for the Plan Update

Goals of the process were discussed that included:

- Update and combine the City and County's Multi-Hazard Mitigation Plans (2005) per the DMA and CRS requirements
- Update and enhance the City and County's mitigation strategies as appropriate
- Re-engage participants, non-governmental stakeholders, and public participation
- Integrate flood hazard data

The plan update will be developed over the next ten months, with at least two more meetings of the HMPC. An email group will be developed for the HMPC for sharing information on upcoming meetings. AMEC will be drafting the updated risk assessment in the next couple of months, with input and data from the HMPC. The first draft for HMPC review is targeted for July, followed by a public review draft in August. A final draft for State and FEMA review is targeted to be complete by September of 2012. The final approved plan should be ready for adoption by December 2012. The next meetings of the HMPC are targeted for May and June, with exact dates TBD. There was discussion about the desire to have the plan completed, approved, and adopted by December 2012 so that participating entities could put in for a PDM grant in the next cycle which will close in December. Jeff noted that the schedule was aggressive but could be accomplished as long as information requests deadlines are adhered to and other factors, such as hazard events, do not interfere.

Review of Identified Hazards

A list of potential natural hazards was discussed, based on hazards identified in the 2005 City and County plans. The focus of the updated, combined Laramie-Cheyenne plan will be on natural hazards, since manmade hazards are not required by DMA 2000 regulations and often dealt with in separate planning mechanisms. However, some man-made hazards will be discussed; hazardous materials, for example, were identified as a serious hazard issue. The hazards discussed that are currently in the plans include:

- Avalanche
- Civil Unrest
- Dam Failure
- Drought
- Earthquake
- Extreme Cold
- Extreme Heat
- Flood
- Hail
- Hazardous Materials
- Landslide
- Land Subsidence
- Power Failure
- Tornado
- Terrorism
- Urban Fire
- Wildland fires
- Winter Storm and Blizzards

The 2005 ratings of these hazards were also discussed. Meeting participants evaluated the validity of including certain hazards in the 2012 plan update and whether some hazard ratings needed to be upgraded or downgraded. Charlie Vosler, representing the town of Burns, said that the town was investigating water quality issues related to the new oil wells located in the area. There have been concerns of water contamination from the oil industry in the planning

area. Participants pointed out that stormwater drainage is an issue of concern in the towns of Albin, Burns, and Pine Bluffs. Jeff raised the question of if there were tornado shelters in the planning area; none of the towns have official, designated tornado shelters. Hazardous materials issues were of major concern to the meeting participants. The Union Pacific Railroad and two major interstates cross through Cheyenne. Additionally, two fixed facilities in the City are a potential source of hazmat issues. Rob Cleveland said that hazmat incidents are identified as his number one hazard in Laramie County's Emergency Response Plan (currently being updated).

The validity of including avalanche and extreme heat in the 2012 update was questioned. The general consensus was that avalanche wasn't really an issue anywhere in the planning area. Extreme heat was identified as a high ranking hazard for the County in 2005, but this typically relates to how extreme heat conditions exacerbate the impacts of drought. Hail, windstorms, and severe winter storms were evaluated as being high ranking hazards in both the County and the City. Participants also determined that extreme cold and dam failure should be ranked as medium hazards for both the County and City, instead of low. The 2012 plan update will reflect these changes in hazard ranking. Hazard rankings will also be revisited and possibly revised further after the risk assessment update is completed.

Planning for Continued Public and Stakeholder Involvement

Two public meetings will be part of the planning process and will coincide with the next HMPC meetings. The first meeting will occur in the middle of the process to gain input on the updated risk assessment. The next series will be held later in the process when the draft plan is out for public review and comment.

A discussion was held on how to coordinate this planning process with other agencies and departments in order to meet one of the DMA planning requirements. It was suggested that coordinating with LEPC meetings or other related planning efforts in the City and/or County could be an effective way to increase public and stakeholder involvement in the HMP planning process. A list of stakeholders and LEPC members was gathered immediately following the kickoff meeting.

Coordination with other Plans

A discussion on coordination with other plans/policies and hazard information sources occurred. The Laramie County Board of Commissioners' Oil and Gas Commission conducted an oil impact study to investigate concerns over the effects of the burgeoning oil industry in the planning area. Bill McHenry stated that the County's Community Wildfire Protection Plans (CWPPs) were largely conceptual at this point in time; they have not been fully developed yet. Other related planning efforts and documents included flood study Letters of Map Revision (LOMRs), the Laramie County Emergency Response Plan, the University of Wyoming Comprehensive Plan, and pandemic flu plans.

Data Collection Needs/Next steps

A data collection guide was distributed to members of HMPC that is designed to facilitate gathering information on hazards, past events, vulnerable assets, and capabilities. Each governmental entity (County, city, town, or special district) that is considering being a fully participating jurisdiction should complete the form, reflecting input from several departments such as public works, road and bridge, planning, building, etc. The HMPC was asked to return to Jeff Brislawn by March 30th, 2012. The HMPC was also asked to review the existing plan, and form a local steering committee within each jurisdiction to gather input into the data collection guide and planning process.

Adjourn

The meeting adjourned at 12:00pm.

Summary prepared by Jeff Brislawn and Hillary King, AMEC Environment and Infrastructure, February 24, 2012.

**LARAMIE COUNTY/CITY OF CHEYENNE
MULTI-HAZARD MITIGATION PLAN
2012 UPDATE**

RISK ASSESSMENT and GOALS UPDATE MEETING

Wednesday, May 30th, 2012

9:00 a.m. to 12:00 p.m.

**Laramie County Emergency Management Agency
3962 Archer Parkway, Cheyenne, WY**

- ❖ **Introductions**

- ❖ **Review of the Planning Process**

- ❖ **Review of Identified Hazards**

- ❖ **Vulnerability Assessment Update Results**

- ❖ **Capability Assessment Review**

- ❖ **Reviewing and Updating Plan Goals**

- ❖ **Public Involvement Activities**

- ❖ **Information Needs and Next Steps**

- ❖ **Questions and Answers/Adjourn**

SIGN-IN SHEET
LARAMIE COUNTY AND CITY OF CHEYENNE
LOCAL HAZARD MITIGATION PLAN UPDATE PROJECT
HMPC #2 & #3 – Risk Assessment Review and Goals Update Meeting

Wednesday, May 30th, 2012 @ 9:00am-12:00pm
 Laramie County Emergency Management Agency
 3962 Archer Parkway, Cheyenne, WY

Name	Jurisdiction/Organizatton/Citizen	Title	Phone	E-mail
Jeff Bristawn	AMEC	PROJECT MANAGER	303-820-4654	Jeff.bristawn@amec.com
Hillary King	AMEC	Jr Planner	303-820-4652	hillary.king@amec.com
Charlie Voslar	Burns	Town Fire Marshall	307-286-7996	FiremanVoz@earthlink.net
Sandra Newland	LC Grants	Grants Manager	307-633-4601	snewland@laramiecounty.com
Bob Anderson	Town of Albin	Town Council	307 246 3331	reanderson65@qnet.com
Jon Taylor	Town of Pine Bluffs	Chief of Police	307-246-3777	chieftaylor@townconnect.net
Jeanne West	LCEMA	Executive Assistant	307-633-7336	jwest@laramiecounty.com
Rob Cleveland	LCEMA	Director	307-633-4333	rcleveland@laramiecounty.com
Bill McHenry	LCEMA	Deputy Director	307-633-4335	brshenry@laramiecounty.com
Mike Vinson	Cheyenne	Staff Engineer	307.637.6246	MVINSON@CheyenneCity.com
Doug Vetter	City of Cheyenne	City Engineer	307 638 4314	dvetter@cheyennecity.org

Summary of the Laramie County/City of Cheyenne Combined Hazard Mitigation Plan Update Risk Assessment Meeting

Wednesday, May 30th, 2012

9:00am to 12:00pm

**Laramie County Emergency Management Agency
3962 Archer Parkway, Cheyenne, WY**

Introductions and Opening Remarks

Jeff Brislawn of AMEC Environment and Infrastructure, the consulting firm hired to facilitate the plan update process, began the meeting with welcoming remarks. Jeff asked everyone around the room to introduce themselves. 10 persons representing a mix of Laramie County/City of Cheyenne agencies and local government representatives from Albin, Pine Bluffs, and Burns were present and documented on a sign in sheet. Departments represented at the meeting included the Burns Fire Department, Laramie County Emergency Management Agency, Laramie County Grants Department, City of Cheyenne Engineering, Pine Bluffs Police Department, and the Albin Town Council. Project team member Hillary King from AMEC was also present. An agenda and hard copies of the maps developed for the plan update were provided as handouts.

Review of Mitigation, Disaster Mitigation Act (DMA) Requirements, and the Planning Process

A PowerPoint presentation was presented by Jeff Brislawn, the project manager from AMEC Environment and Infrastructure. Jeff reviewed the planning process used for updating and combining the Laramie County and City of Cheyenne Hazard Mitigation Plans, approved in 2005. Jeff outlined the ten step planning process that will be followed and discussed the project status.

Risk Assessment Presentation and Discussion

Jeff outlined the general risk assessment requirements before beginning a detailed discussion of each hazard. Jeff and Hillary presented details on each hazard in the draft updated Cheyenne/Laramie County HMP risk assessment chapter. Details included past events, likelihood of occurrence, geographic (spatial) extent, potential magnitude, overall hazard significance, and the City and/or County's existing mitigation capabilities. Refer to the Cheyenne/Laramie County HMP Risk Assessment PowerPoint presentation for specific details on each hazard.

Several valuable details were learned during the risk assessment conversation among participants. Regarding extreme cold, fire sprinkler systems can be damaged or pipes can be frozen, but there is no reliable or thorough data on damages from such incidents. Several flood

hazard issues were pointed out, and the HMPC offered to obtain damage estimates from a 2011 hailstorm.

There was much discussion over hazardous materials issues. Rob Cleveland pointed out that the population of the City of Cheyenne increases significantly during Cheyenne Frontier Days; as many 30,000 people may congregate in Depot Square during that time, increasing the population at risk to hazards such as hazmat. Other important issues raised included water quality concerns and infrastructure damage from the growing oil and tech industry in Laramie County. Heavy industrial trucks and trucks hauling water for drilling and fracking are contributing to damage of the roadways in the County. Fracking is largely unregulated, and residents of the County are concerned that the lack of safety and environmental regulations could contaminate the water supply. Additionally, many farmers in the County are selling water to the oil companies; this tends to provide a much more lucrative income than farming or ranching. An estimated 70% of the County's water use is attributed to agriculture, so a substantial portion of Laramie County's water supply could be sold to the burgeoning oil industry. The HMPC also expressed concern that much of their water supply comes from neighboring Albany County; an event there could impact the water supply in Laramie County.

Bill McHenry of Laramie County EMA is working actively with state and federal government agencies to create codes and regulations for development in the wildland urban interface (WUI). During the wildland fire discussion, the HMPC pointed out that the State's Redzone map from a 2002 study did not accurately represent the wildland fire risk areas in the County. This map will need to be revisited during the plan update process.

During the windstorm discussion, the HMPC mentioned that microbursts need to be discussed in the plan. Microbursts can cause significant damage to signs or crops. Trailer trucks are also in danger of getting blown over during severe windstorms. The HMPC suggested checking with the Wyoming Department of Transportation or the US Department of Agriculture to obtain loss data related to microbursts.

The HMPC provided input on an apparent gap in recent winter storm data in the draft risk assessment. Data indicated that Laramie County did not experience a severe winter storm in the past several years, which would seem counterintuitive given the location and climate of the County. The HMPC said that the data was actually fairly accurate, although there was one death associated with a winter storm in 2007 or 2008.

Plan Goals and Objectives Update

The HMPC revisited the existing goals of the hazard mitigation plans to determine if changes were needed to reflect current priorities. Participants received a handout that listed the overall goals of the two 2005 HMPs, the 2005 City of Cheyenne Flood Hazard Mitigation Plan, and the 2011 Wyoming Multi-Hazard Mitigation Plan. Using the goals from previous or related plans as a guide, participants were instructed to develop a revised list of the 2-3 goals which they felt were the most important for the 2012 plan update. The County's goals from their 2005 plan are captured within the goals from the 2005 Cheyenne plan. The HMPC decided to combine the goals from the previous City and County plan and the 2011 Wyoming HMP and update those goals for the 2012 plan update. In particular, the HMPC wanted to include goal #2 from the

2011 Wyoming HMP. The HMPC suggested that AMEC take an initial approach to revising and simplifying the goals based on the meeting input. AMEC will re-work the goals into a draft for further review and approval at the next HMPC meeting.

Plan Timeline/Next steps

Jeff encouraged participants to review the risk assessment draft for content, accuracy, and ideas, returning comments to him by June 8th for inclusion in the next draft. The HMPC went over target dates for plan milestones, which includes a draft for HMPC review and public review in August. The team decided that the HMPC mitigation strategy meeting would be held on July 11th. The first public meeting will be held on June 14th in conjunction with the Local Emergency Planning Committee (LEPC) meeting.

Adjourn

The meeting adjourned at 12:00pm.

Summary prepared by Jeff Brislawn and Hillary King, AMEC Environment and Infrastructure, June 18, 2012.

**CHEYENNE/LARAMIE COUNTY
HAZARD MITIGATION PLAN
2012 UPDATE**

Mitigation Strategy Development Meeting

Date: July 11th, 2012
Time: 9:00am-12:00pm
Location: Laramie County EMA, 3962 Archer Parkway, Laramie, WY

Agenda

- 1. Opening remarks and introductions**
- 2. Review of the planning process and key issues from the risk assessment and capability assessment**
- 3. Public involvement/public meetings update**
- 4. Finalize goals and objectives**
- 5. Review of possible mitigation activities and alternatives**
- 6. Discuss criteria for mitigation action selection and prioritization**
- 7. Review of progress on existing actions in the plan**
- 8. Brainstorming Session/Development of new mitigation actions (group process)**
- 9. Prioritize mitigation actions (group process)**
- 10. Discuss plan implementation and maintenance**
- 11. Discuss next steps**

SIGN-IN SHEET
CHEYENNE/LARAMIE COUNTY
LOCAL HAZARD MITIGATION PLAN PROJECT
HMPC Meeting #3 – MITIGATION STRATEGY

Wednesday, July 11, 2012 @ 9:00am-12:00pm
 Laramie County EMA, 3962 Archer Parkway, Laramie, WY

Name	Jurisdiction/Organization/Citizen	Title	Phone	E-mail
Jeff Brislaw	AMEC	Project MGR	303-820-4654	jeffbrislaw@amec.com
Hillary King	AMEC	Jr. Planner	303-820-4652	hillary.king@amec.com
Jeanne West	LCEMA	Exec. Assistant	307-633-4336	jwest@laramiecounty.com
Bob Cleveland	LCEMA	Director	307-633-4333	bcleveland@laramiecounty.com
Judy Johnstone Burns		Mayor	307-630-7305	burnsjw@nutmail.com
Mike Vinson	Cheyenne	Engineer	307-637-6246	MVINSON@CHEYENNECITY.ORG
Marshall Dyne	BOPU	Safety/Security	307 421-6906	mdyne@bopu.org
Clint Bassett	BOPU	PE/WC	307 637-6415	cbassett@cheyennebopu.org
Nancy Williams	AMEC	Project Engineer	307-760-5101	nancy.williams@amec.com
Sandra Newland	LC Grants	Grants Manager	307-633-4201	snewland@laramiecounty.com
Doug Vetter	City of Cheyenne	City Engineer	307-638-4314	dvetter@cheyennecity.org

Proof of Publication

THE STATE OF WYOMING)
County of Laramie) ss.

AFFIDAVIT

L.D. Catalano of said County of Laramie, being first duly sworn, deposes and says that he is Controller; or Faith Vroman, of said County of Laramie, being first duly sworn, deposes and says that she is the Secretary of the

Wyoming Tribune-Eagle

a newspaper printed and published in said County and State, and in the Capitol of said State; that the notice of which the annexed is a true copy, has been published in the said newspaper.

For Two
Times, to wit:
June 8, 11, 2012

and that the first publication of said notice was made in said paper bearing date

June 8, A.D. 20 12

and that the last publication of said notice was made in said paper bearing date

June 11, A.D. 20 12

Subscribed in my presence and sworn to before me by the aforesaid L.D. Catalano, Controller or Faith Vroman, Secretary.

this 22nd

Day of June, 20 12

My Commission Expires August 31, 2013 NOTARY PUBLIC

August 31, 2013 STATE OF WYOMING

BY COMMISSION EXPIRES AUG 31, 2013

Christy MacCoy
Notary Public

Public Notice
The Laramie County Local Emergency Planning Committee (LEPC) in conjunction with the Emergency Management Agency conducts meetings on a regular basis. This Public Meeting will discuss the Cheyenne/Laramie County Multi-Hazard Mitigation Plan. To be held in the new EMA facility located at 2902 Archer Parkway Thursday, June 14, 2012 from 11:30am to 1:00pm.
A LEPC meeting to discuss the Cheyenne/Laramie County Multi-Hazard Mitigation Plan will be held at the new EMA facility located at 2902 Archer Parkway on Thursday, June 14, 2012 from 11:30am to 1:00pm. Citizens, elected officials, and emergency responder personnel are encouraged to attend. The purpose of the meeting will be to discuss the development of the Cheyenne/Laramie County Hazard Mitigation Plan, with an emphasis on hazards such as drought, floods, hail, hazardous materials, and wildfires and their potential impacts. The intent of the plan will be to detail the City and County's risk to hazards and outline strategies intended to reduce future losses from these hazards. The plan is being developed by the County under the guidance of the Cheyenne/Laramie County Hazard Mitigation Planning Committee (HMPMC) with assistance from a consultant. The planning process has been underway since February of 2012. Hazards have been identified and ranked using team from the planning team and other sources. A qualitative risk assessment has been completed for the most significant hazards, such as flood and wildfire, to detail the risk to the County and Cheyenne. Public awareness of the effort and comment and input on the draft risk assessment is being sought at this meeting. For more information contact Jeanne West at Laramie County Emergency Management 303-682-4336.
This public notice is issued annually as required under section 12030 of the Federal Emergency Planning and Community Right to Know Act of 1986, regarding hazardous materials.
June 8, 11, 2012.

Thursday June 14, 2012

<u>Name</u>	<u>Agency</u>	<u>Address</u>	<u>Phone</u>	<u>E-mail</u>
Bill Ingraham	Frontier Refinery	2700 East 5th Street	771-8823	bingraham@frontieroil-chey.com
Candis Pickard	CRMC (Safety)	214 E. 23rd St	631-2287	candis.pickard@crmcwy.org
David Block	American Red Cross	3619 Evans Ave	638-8906	blockda@usa.redcross.org
David Sherrill	LC IT	307 W 20th St Ste 1200	633-4560	dsherrill@laramiecounty.com
Gus Lopez	CLCHD	100 Central Ave	633-4000	glopez@laramiecounty.com
James Smith	WDH PHTPP	2300 Capitol Ave	777-6777	'james.smith5@health.wyo.gov'
Jeanine West	EMA	310 W 19th St, Ste 410	633-4336	jwest@laramiecounty.com
Jeffery Chance	Dyno Nobel	8305 Otto Rd	771-5647	jeff.chance@am.dynonobel.com
John Kelley	CLCHD	100 Central Ave	633-4063	jkelly@laramiecounty.com
Joyce Pukash	Chey/LC GIS Group	307 W 20th St Ste 1200	633-4313	jpukash@laramiecounty.com
Kenny Longfritz	PSA U.S. Dep. HS		307-214-9365	kenneth.longfritz@dhs.gov
Megan Romano	Suncor Energy	1715 Fleischli Parkway	775-8117	mromano@suncor.com
Mike Watts	90 CES/CEX	5907 10th Calvary Ave FEWarren	773-4028	michael.watts@warren.af.mil
Rob Cleveland	EMA Director	310 W 19th St, Ste 410	633-4333	rcleveland@laramiecounty.com
Ronnie Reidel	F.E. Warren Fire	6205 10 calvary Ave	773-5516	ronnie.reidel@us.af.mil
Sam Clarke	AMR	600 E Carlson	421-5237	sclarke@amr-ems.com
Smitty Morvant	Kaiser Frontier Midstream	1900 Cr 136	985-438-0812	smitty@centralfieldservices.net
Spencer Pollock	American Red Cross	3619 Evans Ave	638-8906	spencer.pollock@redcross.org
Aarne Haas	Non	1820 Horsecreek Rd	632-9337	athaas@hotmail.com
Sandra Newland	LC Grants	310 W 19th St., Ste 300	633-4201	snewland@laramiecounty.com
Renee Callahan	ARC		541-892-5481	linda.callaha@redcross.org
Charlie Vossler	Burns Fire Marshall	P.O. Box 309	286-7996	firemanvoss@gmail.com
Anthony Ramirez	84th CST	4600 Powderhouse		
Holly Shenefelt	84th CST	4600 Powderhouse	286-3460	holly.shenefelt@us.army.mil
Paul Card	WDH-PHEP			
Mike Vinson	City of Cheyenne	2101 O'Neil Ave		mvinson@cheyennecity.org
Doug Vetter	City of Cheyenne	2101 O'Neil Ave		dvetter@cheyennecity.org
Robert Anderson	Town of Albin		246-3331	
Gary Kranse	LC Planning		633-4522	gkranse@laramiecounty.com
Clay Fuller	WYNG			

Please complete this questionnaire and return by
June 30th, 2012 to:
Attn: Jeanine West
Mail: Laramie County EMA
3962 Archer Parkway
Cheyenne, WY 82009
jwest@laramiecounty.com 307.633.4336

Cheyenne/Laramie County Multi-Hazard Mitigation Plan

Public survey

1. The hazards addressed in the Draft 2012 Multi-Hazard Mitigation Plan Update are listed below. Please indicate the level of significance in Laramie County (note if specific to Cheyenne, Albin, Burns, Pine Bluffs, etc.) that you perceive for each hazard. Please rate these hazards 1 through 3 as follows: 1=low, 2=moderate, 3=high.

- | | |
|---------------------------------------|--|
| <input type="checkbox"/> Dam Failure | <input type="checkbox"/> Hazardous Materials |
| <input type="checkbox"/> Drought | <input type="checkbox"/> Lightning |
| <input type="checkbox"/> Earthquake | <input type="checkbox"/> Tornado |
| <input type="checkbox"/> Extreme Cold | <input type="checkbox"/> Wildland Fire |
| <input type="checkbox"/> Flood | <input type="checkbox"/> Windstorms |
| <input type="checkbox"/> Hail | <input type="checkbox"/> Winter Storms |

2. Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider? Note the jurisdiction to which it applies.

3. The following types of mitigation actions may be considered in Laramie County. Please place a check next to the types of mitigation actions that you think should have the highest priority in the 2012 Cheyenne/Laramie County Multi-Hazard Mitigation Plan Update.

- | | |
|--|---|
| <input type="checkbox"/> Indoor/Outdoor Warning | <input type="checkbox"/> Flood mitigation |
| <input type="checkbox"/> Wildfire Fuels Treatment projects | <input type="checkbox"/> Floodprone Property Buyout |
| <input type="checkbox"/> Continued Participation in the National Flood Insurance Program | <input type="checkbox"/> Education and discounts on flood insurance |
| <input type="checkbox"/> Critical Facilities Protection | <input type="checkbox"/> Tornado shelters |
| <input type="checkbox"/> Planning/Zoning | <input type="checkbox"/> Infrastructure hardening |
| <input type="checkbox"/> Public Education/Awareness | <input type="checkbox"/> Adoption of mutual aid agreements |
| <input type="checkbox"/> Stormwater drainage improvements | <input type="checkbox"/> Upgrading emergency communication systems |

4. Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by natural disasters (use the back of this form if needed).

5. Provide your name and email address if you would like to be added to a distribution list for upcoming activities related to the planning process:



CHEYENNE / LARAMIE COUNTY EMERGENCY MANAGEMENT AGENCY

Emergency Management • Fire Warden
Rob Cleveland, Director • Bill McHenry, Deputy Director

LEPC Meeting Agenda October 25, 2012 11:30am-1:00pm

1. Welcome
2. Lunch
3. Presentation: Combined Laramie County Mitigation and Strategy Plan 2012 Update: draft for public review (Jeff Brislaw and Hillary King – AMEC)
 - o Review of the planning process
 - o Review of the identified hazards
 - o Plan goals and objectives
 - o Mitigation strategy overview
 - o Plan implementation
 - o Next steps
 - o Q&A and feedback
4. Round Table
5. Adjourn

3962 Archer Parkway • Cheyenne, WY 82009
(307) 633-4333 Fax: 633-4337

From: Jeanine West

Sent: Monday, October 15, 2012 10:47 AM

To: 'mcruffl_b@msc.com'; 'bruce.byrne@warren.af.mil'; 'bruce.wrbell@va.gov'; 'kyon.cooper@health.wyo.gov'; 'caedris.pirkard@cmccor.org'; 'carly.york@ang.af.mil'; 'christopher.hughes@verdin.af.mil'; 'andy.osborne@amr.net'; 'vbasett@cheyennebopu.org'; Danny Glick; 'bcb@usa.ecd.com'; 'david.a.hays@spgo.com'; David Sherrill; 'jgriffith@kcc.wy.edu'; 'don.bridges@kctd.state.wy.us'; 'eric.smith@am.dynobel.com'; 'erica.bannon@cmcey.org'; 'julio.maioroni@ang.af.mil'; 'frank.cornelio@us.army.mil'; 'gary@uicar.edu'; 'jmichey@barroncontractors.com'; 'bob.bridges@kctd.state.wy.us'; 'holly.hibenef@us.army.mil'; 'james.smith@health.wyo.gov'; Jeanine West; 'jeremy.wagner@us.army.mil'; 'jmarlin@cheyennecity.org'; 'joshell@cheyennepaper.com'; 'joel.gard@warren.af.mil'; 'john.griffith@caa.gov'; John Kelley; 'john.mutz@wal-mart.com'; 'jrcvnt@inclairoil.com'; 'joshua.speck@us.army.mil'; Joyce Gilligan; 'julle.meyer@wal-mart.com'; 'jenneth.king@cheyenne.af.mil'; 'khanter@cheyennecity.org'; Lt. Linda Gessell; 'mrorford@cheyennecity.org'; 'mpapone@cheyennepopu.org'; Marty Luna; 'mrmw@stetson.com'; 'michael.wright@warren.af.mil'; 'michelle@wal-mart.com'; 'michael.watts@warren.af.mil'; 'bill.sault@ang.af.mil'; Rob Cleveland; 'ronald.pavelo@warren.af.mil'; 'ronnie.niekirk@us.af.mil'; 'scott@barron.com'; 'smesler@uncor.com'; 'timothy@cheyennebopu.org'; 'roncer.poltos@nekronis.org'; 'tchadman@cheyenne.net'; 'tshuch@stoc.net'; 'anthony.bradley@ang.af.mil'; 'tmon1990@yahoo.com'; 'warren.whitman@ng.af.mil'; 'wey.eccd@ang.af.mil'; 'wesliher@croc.star.hartman@new.org'; 'wyar.lindsay@ang.af.mil'; 'mclinn@cheyennecity.org'; Bill McHenry; 'wenderson@yahoo.com'; 'wmler@connect.net'; 'tremarwad@gmail.com'; 'wveller@cheyennecity.org'

Subject: October 25, 2012 LEPC Meeting

The next LEPC meeting is scheduled for:

Thursday October 25, 2012 from 11:30am to 1:00pm

The meeting will be held in the new EMA facility located at 3962 Archer Parkway.

- Directions:
- Take I-80 East to Exit 362, Archer
 - Off exit take a right
 - Take the second right out of the roundabout
 - New building will be to the right

Lunch will be provided

Presentation: Jeff Brislaw and Hillary King from AMEC will be here to discuss the draft of the Cheyenne / Laramie County Mitigation Plan.

*To view the draft prior to the meeting it can be viewed at the following sites:

- www.laramiecounty.com (Emergency Management page)
 - www.cheyennecity.org (Engineering Department page)
 - www.pinebluffswy.gov
- Paper copies are available to view at the Laramie County Library, Burns

Town Hall and the Emergency Management

Agency.

If you should have any questions please contact me.

Thank you,
Jeanine West
Executive Assistant
Laramie County Emergency Management
307-633-4336

Thursday October 25, 2012

Name	Agency	Address	Phone	E-mail
Bill McHenry	EMA	310 W 19th St, Ste 410	633-4335	bmchenry@laramiecounty.com
Brian McNutt	LC Ares/Races	4501 E 13th St	421-1801	mcnutt_b@msn.com
Cindy Osborne	AMR	600 E Carlson, Suite 101	635-8533	cindy.osborne@amr.net
David Sherrill	LC IT	307 W 20th St Ste 1200	633-4560	dsherrill@laramiecounty.com
Holly Shenefelt	84th CST	4600 Powderhouse	286-3460	holly.shenefelt@us.army.mil
Jeanine West	EMA	310 W 19th St, Ste 410	633-4336	west@laramiecounty.com
Jeremy Wagner	WY National Guard	5500 Bishop Blvd	772-5460	jeremy.wagner3@us.army.mil
Jim Schell	Cheyenne Regional Airport	4000 Airport Parkway	634-7071	jschell@cheyenneairport.com
Jon Seelye	84th CST	4600 Powderhouse	772-5392	jonathan.seelye@us.army.mil
Kenny Longfritz	PSA U.S. Dep. HS	2120 capitol Ave, Ste 7015	307-214-9365	kenneth.longfritz@dhs.gov
Rob Cleveland	EMA Director	310 W 19th St, Ste 410	633-4333	rcleveland@laramiecounty.com
Stan Hartman, Dr	CLCHD	100 Central Ave	214-6011	sehartman@bresnan.net
Dave Jenkins	Plains Pipeline	PO 168 Fort Laramie WY	307-837-2121	dajenkins@paalp.com
Melinda Gibson	WOHS	5500 Bishop Blvd	777-4914	melinda.gobson@wyo.gov
Judy Johnstone	Burns	P.O. Box 66, Burns, WY 82053	307-547-3637	judyjohnstone@lppbroadband.net
Robin Clark	Pine Bluffs	205 Main St., Pine Bluffs	245-3777	rclark@rtconnect.net
Lori Demello	AMR	600 E Carlson, Suite 101	635-8533	
Renee Callahan	American Red Cross	3619 Evans Ave	256-0071	renee.callahan@redcross.org
Aarne Haas	Public	1820 Horsecreek Rd	632-9337	alhaas@hotmail.com
Chris Machan	CLCHD	100 Central Ave	633-4115	cschrader@laramiecounty.com
Bob Anderson	Albin	P.O. Box 51, Albin, WY 82050	307-246-3331	reanderson65@yahoo.com
Mike Vinson	City of Cheyenne	2101 O'Neil Ave, Cheyenne, WY 82001	307-637-6246	mvinson@cheyennecity.org
Doug Vetter	City of Cheyenne	2101 O'Neil Ave, Cheyenne, WY 82001	307-638-4314	dvetter@cheyennecity.org
Anthony Ramirez	84th CST	4600 Powderhouse	286-3472	
Sandra Newland	Laramie County Grants	310 W 19th St, Ste 300	633-4201	snewland@laramiecounty.com
Paul Phillips	WYNG JOC	5410 Bishop Blvd	631-5124	paul.t.phillips@us.army.mil
Tom McDonough	Pine Bluffs	205 Main St., Pine Bluffs	307-245-3746	tmcdonough@rtconnect.net

Please complete this questionnaire and return by
October 29th, 2012 to:
Attn: Jennine West
Mail: Laramie County EMA
3962 Archer Parkway
Cheyenne, WY 82009
jwest@laramiecounty.com 307.633.4336

Combined Cheyenne/ Laramie County Hazard Mitigation and Strategy Plan

Public survey

1. Use this form to make any comments on the draft update to the Combined Laramie County Mitigation and Strategy Plan. The plan can be downloaded from the County's website:

http://www.laramiecounty.com/departments/emergency_management/index.asp

2. Please list the top three proposed mitigation action items, from your perspective, that the County or participating jurisdictions should implement first. See the Action Summary Table and list the Action ID# below.

3. Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by natural disasters (use the back of this form if needed).

4. Provide your name and email address if you would like to support the implementation of a specific project, and list the project(s) that you may choose to support. Support can include in-kind assistance (i.e. distributing outreach materials), partnership, technical, and/or financial.

FOR IMMEDIATE RELEASE

**COMBINED LARAMIE COUNTY MITIGATION AND STRATEGY PLAN UPDATE
AVAILABLE FOR PUBLIC REVIEW**

September 27, 2012 – Would you like to learn more about what Laramie County is doing to minimize the impacts of floods, wildfires, hazardous materials incidents, and other natural and man-made hazards? A draft of Laramie County's updated Mitigation and Strategy Plan is being made available for public review and comment. Multi-hazard mitigation plans were first completed for Laramie County and the City of Cheyenne in 2005. In 2012 Laramie County Emergency Management initiated the effort to combine and update the previous multi-hazard mitigation plans in accordance with the FEMA five-year update cycle. The 2012 Combined Laramie County Mitigation and Strategy Plan Update covers the participating jurisdictions of Laramie County, the City of Cheyenne, Albin, Burns, and Pine Bluffs. The Plan Update assesses risks posed by natural and man-made hazards, identifies ways to reduce those risks, and allows Laramie County and participating jurisdictions to maintain eligibility for mitigation funding from FEMA. A Hazard Mitigation Planning Committee (HMPC) that includes representatives from the County, City of Cheyenne, Albin, Burns, Pine Bluffs, and other local departments is currently updating the Plan with assistance from a consultant. During the Plan update process the HMPC has revisited and updated the Plan's vulnerability assessment, goals and objectives, and mitigation projects. The HMPC is now soliciting public comment and input on the Combined Laramie County Mitigation and Strategy Plan Update.

The comment period will be October 1, 2012 - October 25, 2012.

The plan can be accessed at the following websites:

www.laramiecounty.com

www.cheyennecity.org

www.pinebluffswy.gov

Hardcopies will also be available for review upon request through Laramie County Emergency Management, the Laramie County Library and the Burns Town Hall.

A public meeting to discuss the plan will be held on Thursday, October 25, 2012 at the Laramie County Emergency Management Agency from 11:30am to 1:00pm.

For more information, contact Jeanine West at 307-633-4336 or jwest@laramiecounty.com.

Please complete this questionnaire and return by June 30th, 2012 to:
 Attn: Jeanine West
 Mail: Laramie County EMA
 3962 Archer Parkway
 Cheyenne, WY 82009
 jwest@laramiecountv.com 307.633.4336

Cheyenne/Laramie County Multi-Hazard Mitigation Plan

Public survey

1. The hazards addressed in the Draft 2012 Multi-Hazard Mitigation Plan Update are listed below. Please indicate the level of significance in Laramie County (note if specific to Cheyenne, Albin, Burns, Pine Bluffs, etc.) that you perceive for each hazard. Please rate these hazards 1 through 3 as follows: 1=low, 2=moderate, 3=high.

- | | |
|--|---|
| <input checked="" type="checkbox"/> 3 Dam Failure | <input checked="" type="checkbox"/> 3 Hazardous Materials |
| <input checked="" type="checkbox"/> 2 Drought | <input checked="" type="checkbox"/> 2 Lightning |
| <input type="checkbox"/> 1 Earthquake | <input checked="" type="checkbox"/> 2 Tornado |
| <input checked="" type="checkbox"/> 3 Extreme Cold | <input checked="" type="checkbox"/> 3 Wildland Fire |
| <input checked="" type="checkbox"/> 2 Flood | <input checked="" type="checkbox"/> 2 Windstorms |
| <input checked="" type="checkbox"/> 2 Hail | <input checked="" type="checkbox"/> 3 Winter Storms |

2. Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider? Note the jurisdiction to which it applies.

*Burns Township and General area
 The Rail Road, Hazardous Materials and Education and involvement
 for Response
 Refinery location and materials.*

3. The following types of mitigation actions may be considered in Laramie County. Please place a check next to the types of mitigation actions that you think should have the highest priority in the 2012 Cheyenne/Laramie County Multi-Hazard Mitigation Plan Update.

- | | |
|--|---|
| <input checked="" type="checkbox"/> Indoor/Outdoor Warning | <input type="checkbox"/> Flood mitigation |
| <input type="checkbox"/> Wildfire Fuels Treatment projects | <input type="checkbox"/> Floodprone Property Buyout |
| <input type="checkbox"/> Continued Participation in the National Flood Insurance Program | <input type="checkbox"/> Education and discounts on flood insurance |
| <input type="checkbox"/> Critical Facilities Protection | <input type="checkbox"/> Tornado shelters |
| <input checked="" type="checkbox"/> Planning/Zoning | <input type="checkbox"/> Infrastructure hardening |
| <input checked="" type="checkbox"/> Public Education/Awareness | <input type="checkbox"/> Adoption of mutual aid agreements |
| <input type="checkbox"/> Stormwater drainage improvements | <input checked="" type="checkbox"/> Upgrading emergency communication systems |

4. Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by natural disasters (use the back of this form if needed).

Wild Land Fire Education and Training.

5. Provide your name and email address if you would like to be added to a distribution list for upcoming activities related to the planning process:

Charlie Vosler Fireman Vol 60 E-mail.com

Please complete this questionnaire and return by June 30th, 2012 to:
 Attn: Jeanne West
 Mail: Laramie County EMA
 3962 Archer Parkway
 Cheyenne, WY 82009
 jwest@laramiecounty.com 307.633.4336

Cheyenne/Laramie County Multi-Hazard Mitigation Plan

Public survey

1. The hazards addressed in the Draft 2012 Multi-Hazard Mitigation Plan Update are listed below. Please indicate the level of significance in Laramie County (note if specific to Cheyenne, Albin, Burns, Pine Bluffs, etc.) that you perceive for each hazard. Please rate these hazards 1 through 3 as follows: 1=low, 2=moderate, 3=high.

- | | |
|---|--|
| <input type="checkbox"/> 1 Dam Failure | <input type="checkbox"/> 2 Hazardous Materials |
| <input type="checkbox"/> 2 Drought | <input type="checkbox"/> 2 Lightning |
| <input type="checkbox"/> 1 Earthquake | <input type="checkbox"/> 2 Tornado |
| <input type="checkbox"/> 3 Extreme Cold | <input type="checkbox"/> 2 Wildland Fire |
| <input type="checkbox"/> 2 Flood | <input type="checkbox"/> 2 Windstorms |
| <input type="checkbox"/> 2 Hail | <input type="checkbox"/> 2 Winter Storms |

2. Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider? Note the jurisdiction to which it applies.

NATURAL GAS WALLS AND THEIR EFFECT ON AIR/WATER

3. The following types of mitigation actions may be considered in Laramie County. Please place a check next to the types of mitigation actions that you think should have the highest priority in the 2012 Cheyenne/Laramie County Multi-Hazard Mitigation Plan Update.

- | | |
|---|---|
| <input checked="" type="checkbox"/> Indoor/Outdoor Warning | <input checked="" type="checkbox"/> Flood mitigation |
| <input checked="" type="checkbox"/> Wildfire Fuels Treatment projects | <input type="checkbox"/> Floodprone Property Buyout |
| <input checked="" type="checkbox"/> Continued Participation in the National Flood Insurance Program | <input type="checkbox"/> Education and discounts on flood insurance |
| <input type="checkbox"/> Critical Facilities Protection | <input checked="" type="checkbox"/> Tornado shelters |
| <input type="checkbox"/> Planning/Zoning | <input type="checkbox"/> Infrastructure hardening |
| <input type="checkbox"/> Public Education/Awareness | <input type="checkbox"/> Adoption of mutual aid agreements |
| <input checked="" type="checkbox"/> Stormwater drainage improvements | <input checked="" type="checkbox"/> Upgrading emergency communication systems |

4. Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by natural disasters (use the back of this form if needed).

5. Provide your name and email address if you would like to be added to a distribution list for upcoming activities related to the planning process:

Please complete this questionnaire and return by
 June 30th, 2012 to:
 Attn: Jeanne West
 Mail: Laramie County EMA
 3962 Archer Parkway
 Cheyenne, WY 82009
 jwest@laramiecounty.com 307.633.4336

Cheyenne/Laramie County Multi-Hazard Mitigation Plan

Public survey

1. The hazards addressed in the Draft 2012 Multi-Hazard Mitigation Plan Update are listed below. Please indicate the level of significance in Laramie County (note if specific to Cheyenne, Albin, Burns, Pine Bluffs, etc.) that you perceive for each hazard. Please rate these hazards 1 through 3 as follows: 1=low, 2=moderate, 3=high.

- | | |
|--|---|
| <input checked="" type="checkbox"/> Dam Failure | <input checked="" type="checkbox"/> Hazardous Materials |
| <input checked="" type="checkbox"/> Drought | <input checked="" type="checkbox"/> Lightning |
| <input type="checkbox"/> Earthquake | <input checked="" type="checkbox"/> Tornado |
| <input checked="" type="checkbox"/> Extreme Cold | <input checked="" type="checkbox"/> Wildland Fire |
| <input checked="" type="checkbox"/> Flood | <input checked="" type="checkbox"/> Windstorms |
| <input checked="" type="checkbox"/> Hail | <input checked="" type="checkbox"/> Winter Storms |

2. Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider? Note the jurisdiction to which it applies.

3. The following types of mitigation actions may be considered in Laramie County. Please place a check next to the types of mitigation actions that you think should have the highest priority in the 2012 Cheyenne/Laramie County Multi-Hazard Mitigation Plan Update.

- | | |
|--|---|
| <input type="checkbox"/> Indoor/Outdoor Warning | <input type="checkbox"/> Flood mitigation |
| <input type="checkbox"/> Wildfire Fuels Treatment projects | <input type="checkbox"/> Floodprone Property Buyout |
| <input type="checkbox"/> Continued Participation in the National Flood Insurance Program | <input type="checkbox"/> Education and discounts on flood insurance |
| <input checked="" type="checkbox"/> Critical Facilities Protection | <input checked="" type="checkbox"/> Tornado shelters |
| <input type="checkbox"/> Planning/Zoning | <input type="checkbox"/> Infrastructure hardening |
| <input type="checkbox"/> Public Education/Awareness | <input type="checkbox"/> Adoption of mutual aid agreements |
| <input checked="" type="checkbox"/> Stormwater drainage improvements | <input checked="" type="checkbox"/> Upgrading emergency communication systems |

4. Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by natural disasters (use the back of this form if needed).

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- | | |
|--|---|
| <input type="checkbox"/> Dam Failure | <input checked="" type="checkbox"/> Hazardous Materials |
| <input checked="" type="checkbox"/> Drought | <input checked="" type="checkbox"/> Lightning |
| <input type="checkbox"/> Earthquake | <input checked="" type="checkbox"/> Tornado |
| <input checked="" type="checkbox"/> Extreme Cold | <input checked="" type="checkbox"/> Wildland Fire |
| <input checked="" type="checkbox"/> Flood | <input checked="" type="checkbox"/> Windstorms |
| <input checked="" type="checkbox"/> Hail | <input checked="" type="checkbox"/> Winter Storms |

2. Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider? Note the jurisdiction to which it applies.

*SOME KIND OF BIOLOGICAL PLAN FOR LIVESTOCK AND/OR HUMANS.
 -STATE IS DEPENDANT ON CATTLE.*

3. The following types of mitigation actions may be considered in Laramie County. Please place a check next to the types of mitigation actions that you think should have the highest priority in the 2012 Cheyenne/Laramie County Multi-Hazard Mitigation Plan Update.

- | | |
|--|---|
| <input checked="" type="checkbox"/> Indoor/Outdoor Warning | <input type="checkbox"/> Flood mitigation |
| <input checked="" type="checkbox"/> Wildfire Fuels Treatment projects | <input type="checkbox"/> Floodprone Property Buyout |
| <input type="checkbox"/> Continued Participation in the National Flood Insurance Program | <input type="checkbox"/> Education and discounts on flood insurance |
| <input checked="" type="checkbox"/> Critical Facilities Protection | <input type="checkbox"/> Tornado shelters |
| <input type="checkbox"/> Planning/Zoning | <input checked="" type="checkbox"/> Infrastructure hardening |
| <input type="checkbox"/> Public Education/Awareness | <input type="checkbox"/> Adoption of mutual aid agreements |
| <input type="checkbox"/> Stormwater drainage improvements | <input checked="" type="checkbox"/> Upgrading emergency communication systems |

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Cheyenne/Laramie County Multi-Hazard Mitigation Plan

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- | | |
|---|---|
| <input type="checkbox"/> Dam Failure | 3 <input checked="" type="checkbox"/> Hazardous Materials |
| 1 <input type="checkbox"/> Drought | 1 <input type="checkbox"/> Lightning |
| 1 <input type="checkbox"/> Earthquake | 3 <input checked="" type="checkbox"/> Tornado |
| 1 <input type="checkbox"/> Extreme Cold | 2 <input type="checkbox"/> Wildland Fire |
| 2 <input type="checkbox"/> Flood | 2 <input type="checkbox"/> Windstorms |
| 2 <input type="checkbox"/> Hail | 2 <input type="checkbox"/> Winter Storms |

2. Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider? Note the jurisdiction to which it applies.

3. The following types of mitigation actions may be considered in Laramie County. Please place a check next to the types of mitigation actions that you think should have the highest priority in the 2012 Cheyenne/Laramie County Multi-Hazard Mitigation Plan Update.

- | | |
|--|---|
| <input checked="" type="checkbox"/> Indoor/Outdoor Warning | <input type="checkbox"/> Flood mitigation |
| <input checked="" type="checkbox"/> Wildfire Fuels Treatment projects | <input type="checkbox"/> Floodprone Property Buyout |
| <input type="checkbox"/> Continued Participation in the National Flood Insurance Program | <input type="checkbox"/> Education and discounts on flood insurance |
| <input type="checkbox"/> Critical Facilities Protection | <input checked="" type="checkbox"/> Tornado shelters |
| <input type="checkbox"/> Planning/Zoning | <input checked="" type="checkbox"/> Infrastructure hardening |
| <input type="checkbox"/> Public Education/Awareness | <input type="checkbox"/> Adoption of mutual aid agreements |
| <input type="checkbox"/> Stormwater drainage improvements | <input type="checkbox"/> Upgrading emergency communication systems |

4. Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by natural disasters (use the back of this form if needed).

5. Provide your name and email address if you would like to be added to a distribution list for upcoming activities related to the planning process:

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- | | |
|---|---|
| <input type="checkbox"/> Dam Failure | <input type="checkbox"/> Hazardous Materials |
| <input type="checkbox"/> Drought | <input type="checkbox"/> Lightning |
| <input type="checkbox"/> Earthquake | <input checked="" type="checkbox"/> Tornado <i>3 Cheyenne</i> |
| <input type="checkbox"/> Extreme Cold | <input type="checkbox"/> Wildland Fire |
| <input checked="" type="checkbox"/> Flood <i>3 Cheyenne</i> | <input type="checkbox"/> Windstorms |
| <input type="checkbox"/> Hail | <input type="checkbox"/> Winter Storms |

2. Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider? Note the jurisdiction to which it applies.

The areas along College drive during last four storms (last summer + this year) have flooded by parking - even flooded on occasions. In the normal? Are there plans to address this

3. The following types of mitigation actions may be considered in Laramie County. Please place a check next to the types of mitigation actions that you think should have the highest priority in the 2012 Cheyenne/Laramie County Multi-Hazard Mitigation Plan Update.

- | | |
|--|---|
| <input type="checkbox"/> Indoor/Outdoor Warning | <input type="checkbox"/> Flood mitigation |
| <input type="checkbox"/> Wildfire Fuels Treatment projects | <input type="checkbox"/> Floodprone Property Buyout |
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| <input checked="" type="checkbox"/> Public Education/Awareness | <input type="checkbox"/> Adoption of mutual aid agreements |
| <input checked="" type="checkbox"/> Stormwater drainage improvements | <input type="checkbox"/> Upgrading emergency communication systems |

4. Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by natural disasters (use the back of this form if needed).

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Cheyenne/Laramie County Multi-Hazard Mitigation Plan

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- | | |
|--|---|
| <input checked="" type="checkbox"/> 3 Dam Failure | <input checked="" type="checkbox"/> 3 Hazardous Materials |
| <input checked="" type="checkbox"/> 3 Drought | <input type="checkbox"/> 1 Lightning |
| <input type="checkbox"/> 1 Earthquake | <input checked="" type="checkbox"/> 2 Tornado |
| <input checked="" type="checkbox"/> 2 Extreme Cold | <input type="checkbox"/> 1 Wildland Fire |
| <input checked="" type="checkbox"/> 3 Flood | <input checked="" type="checkbox"/> 2 Windstorms |
| <input checked="" type="checkbox"/> 2 Hail | <input checked="" type="checkbox"/> 3 Winter Storms |

2. Do you have information on specific hazard issues/problem areas that you would like the planning committee to consider? Note the jurisdiction to which it applies.

Excellent coverage seen so far

3. The following types of mitigation actions may be considered in Laramie County. Please place a check next to the types of mitigation actions that you think should have the highest priority in the 2012 Cheyenne/Laramie County Multi-Hazard Mitigation Plan Update.

- | | |
|---|---|
| <input type="checkbox"/> Indoor/Outdoor Warning | <input checked="" type="checkbox"/> Flood mitigation |
| <input type="checkbox"/> Wildfire Fuels Treatment projects | <input type="checkbox"/> Floodprone Property Buyout |
| <input checked="" type="checkbox"/> Continued Participation in the National Flood Insurance Program | <input type="checkbox"/> Education and discounts on flood insurance |
| <input type="checkbox"/> Critical Facilities Protection | <input type="checkbox"/> Tornado shelters |
| <input type="checkbox"/> Planning/Zoning | <input type="checkbox"/> Infrastructure hardening |
| <input checked="" type="checkbox"/> Public Education/Awareness | <input checked="" type="checkbox"/> Adoption of mutual aid agreements |
| <input type="checkbox"/> Stormwater drainage improvements | <input checked="" type="checkbox"/> Upgrading emergency communication systems |

4. Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by natural disasters (use the back of this form if needed).

Being covered

5. Provide your name and email address if you would like to be added to a distribution list for upcoming activities related to the planning process:

Please complete this questionnaire and return by
October 29th, 2012 to:
Attn: Jeanne West
Mail: Laramie County EMA
3962 Archer Parkway
Cheyenne, WY 82009
jwest@laramiecounty.com 307.633.4336

Combined Laramie County Mitigation and Strategy Plan

Public survey

1. Use this form to make any comments on the draft update to the Combined Laramie County Mitigation and Strategy Plan. The plan can be downloaded from the County's website:
http://www.laramiecounty.com/departments/emergency_management/index.asp

Great Job, the plan is very inclusive!

2. Please list the top three proposed mitigation action items, from your perspective, that the County or participating jurisdictions should implement first. See the Action Summary Table and list the Action ID# below.

#5, 8 and 22

3. Please comment on any other pro disaster strategies that the planning committee should consider for reducing future losses caused by natural disasters (use the back of this form if needed).

4. Provide your name and email address if you would like to support the implementation of a specific project, and list the project(s) that you may choose to support. Support can include in-kind assistance (i.e. distributing outreach materials), partnership, technical, and/or financial.

Please complete this questionnaire and return by
October 29th, 2012 to:
Attn: Jeanine West
Mail: Laramie County EMA
3962 Archer Parkway
Cheyenne, WY 82009
jwest@laramiecounty.com 307.633.4336

Combined Laramie County Mitigation and Strategy Plan

Public survey

1. Use this form to make any comments on the draft update to the Combined Laramie County Mitigation and Strategy Plan. The plan can be downloaded from the County's website:
http://www.laramiecounty.com/departments/emergency_management/index.asp

2. Please list the top three proposed mitigation action items, from your perspective, that the County or participating jurisdictions should implement first. See the Action Summary Table and list the Action ID# below.

- 8 All hazards public education
- 17 Installation of back-up generator @ Albin community center
- 4. 0-1 + gas safety development plan

3. Please comment on any other pre-disaster strategies that the planning committee should consider for reducing future losses caused by natural disasters (use the back of this form if needed).

-Pine beetle kill reduction (removal of dead trees)

4. Provide your name and email address if you would like to support the implementation of a specific project, and list the project(s) that you may choose to support. Support can include in-kind assistance (i.e. distributing outreach materials), partnership, technical, and/or financial.

Mitigation Planning Team Meeting January 29, 2013

Name	Area Representing	Mailing Address	Phone	E-Mail
Rob Cleveland	LC EMA			
Joanni West	LC EMA			
Bill Matterny	LC EMA			
Robin Clark	PBPD			
Charlie Varley	Burns, Inc Marshall			
Bob Anderson	Town of Albin			
Hillary King	AMEC			
Jeff Brislawn	AMEC			
AARON MURRAY	AMEC			
Jandra Newland	LC Grants			
MIKE VINSON	Cheyenne			
Tam McDaniel	Private Bluffs			
Melinda Gibson	WOHS	5500 Bishop Blvd Cheyenne, WY 82002	307.777.4914	melinda.gibson@wyo.gov

Appendix C. HAZARD MITIGATION PLANNING COMMITTEE

Table C.1 HMPC Contact List

Name	Department	Position	Phone	Email
Laramie County				
Rob Cleveland	Laramie County Emergency Management Agency	Director	307-633-4333	rcleveland@laramiecounty.com
Bill McHenry	Laramie County Emergency Management Agency	Deputy Director/Fire Warden	307-633-4335	bmchenry@laramiecounty.com
Jeanine West	Laramie County Emergency Management Agency	Executive Assistant	307-633-4336	jwest@laramiecounty.com
Sandra Newland	Laramie County Grants	Manager	307-633-4201	snewland@laramiecounty.com
Gary Kranse	Laramie County Planning	Director		
Don Beard	Laramie County Public Works	Director		
Joyce Pukash	Cheyenne/Laramie County GIS	Program Manager	307-633-4281	
David Sherrill	Cheyenne/Laramie County GIS	Coordinator	307-633-4281	
Glen Crumpton	Laramie County Combined Communications Center	Director		
Laramie County Commissioners	Laramie County Commissioners			
City of Cheyenne				
Doug Vetter	Cheyenne Engineer's Office	City Engineer	307-638-4314	dvetter@cheyennecity.org
Mike Vinson	Cheyenne Engineer's Office	Staff Engineer	307-637-6246	mvinson@cheyennecity.org
Jim Martin	Cheyenne Fire and Rescue	Chief	307-637-6315	jmartin@cheyennecity.org
Sam Berta	Cheyenne Engineer's Office	Staff Engineer	307-637-6290	sberta@cheyennecity.org
Marshall Payne	Board of Public Utilities	Safety/Security Officer		
Clint Bassett	Board of Public Utilities	Water Conservation Officer		
Town of Albin				
Bob Anderson	Albin Town Council	Town Council Representative	307-246-3331	reanderson65@yahoo.com

Name	Department	Position	Phone	Email
Kelly Krakow	Town of Albin	Mayor	307-246-3386	kkrakow@farmersagent.com
Bill Hill	Albin Town Maintenance	Director		
Town of Albin Mayor and Town Council				
Town of Burns				
Charlie Vosler	Town of Burns	Fire Marshall	307-286-7996	firemanvoz@gmail.com
Judy Johnstone	Town of Burns	Mayor	307-547-2206 (o) 307-316-0020 (h)	judyjohnstone@lpbroadband.net
Town of Burns Mayor and Town Council				
Town of Pine Bluffs				
Caryn Miller	Town of Pine Bluffs	Town Administrator	307-245-3746	cmiller@rtconnect.net
Don Taylor	Pine Bluffs Police Department	Police Chief	307-245-3777	chieftaylor@rtconnect.net
Tom McDonough	Town of Pine Bluffs Public Works/Utilities	Director	307-245-3746	tmcdonough@rtconnect.net
Town of Pine Bluffs Mayor and Town Council				
Special Districts				
Fire Districts - Laramie County Fire Chief's Association				
State/Local /Regional/Private Stakeholders				
Various	Laramie County LEPC			
AMEC Planning Team				
Jeff Brislawn		Consultant/Project Manager	303-820-4654	jeff.brislawn@amec.com
Hillary King		Junior Mitigation Planner	303-820-4652	hillary.king@amec.com
Mack Chambers		GIS Specialist	303-820-4663	mack.chambers@amec.com

* Indicates participated in HMPC meetings in 2012. All entities noted in table were sent a letter with invitation to participate. Some provided comments or data for the draft plan. This table was built from a master contact list on file with the Laramie County Emergency Management Agency.

Appendix D REFERENCES

American Meteorological Society, *Glossary of Meteorology*, 2nd Edition
<http://amsglossary.allenpress.com/glossary>

Beaufort Wind Scale. National Oceanographic and Atmospheric Association,
<http://www.spc.noaa.gov/faq/tornado/beaufort.html>

Enhanced Fujita Scale. National Oceanic and Atmospheric Administration Storm Prediction Center
<http://www.spc.noaa.gov/faq/tornado/ef-scale.html>

Federal Emergency Management Agency
<http://www.fema.gov/>

Federal Wildland Fire Occurrence Data
<http://wildfire.cr.usgs.gov/firehistory/data.html>

FEMA How-To Guide 433: Using HAZUS-MH for Risk Assessment
<http://www.fema.gov/plan/prevent/rms/rmsp433.shtm>

FEMA Understanding Your Risks: Identifying Hazards and Estimating Losses (2001).
<http://www.fema.gov/library/viewRecord.do?id=1880>

Fujita Scale. National Oceanic and Atmospheric Administration Storm Prediction Center,
<http://www.spc.noaa.gov/faq/tornado/f-scale.html>

Modified Mercalli Intensity and peak ground acceleration (PGA) (Wald, et al 1999).
http://ecf.caltech.edu/~heaton/papers/Wald_intensity.pdf

National Agricultural Statistics Service, U.S. Department of Agriculture.
<http://www.nass.usda.gov/>

National Climatic Data Center
<http://www.ncdc.noaa.gov/oa/ncdc.html>

National Flood Insurance Program
<http://www.fema.gov/national-flood-insurance-program>

National Institute of Building Science Multi-Hazard Mitigation Council.
<http://www.nibs.org/index.php/mmc/>

National Interagency Fire Center
<http://www.nifc.gov/>

National Lightning Safety Institute

<http://www.lightningsafety.com/>

National Oceanic and Atmospheric Agency

<http://www.noaa.gov/>

National Register of Historic Places

<http://www.nps.gov/history/nr/>

National Response Center

<http://www.nrc.uscg.mil/>

National Weather Association (NWA) Online Glossary

<http://w1.weather.gov/glossary/>

National Weather Service

<http://www.weather.gov/>

Public Entity Risk Institute (PERI) Presidential Disaster Declaration Site.

<http://www.peripresdecusa.org/mainframe.htm>

Small Business Administration

<http://www.sba.gov/>

Spatial Hazard Events and Losses Database for the United States.

<http://webra.cas.sc.edu/hvri/products/sheldus.aspx>

State of Wyoming Multi-Hazard Mitigation Plan (2011).

http://wyohomelandsecurity.state.wy.us/mitigation_plan.aspx

United State Environmental Protection Agency

<http://www.epa.gov/>

United States Army Corps of Engineers

<http://www.usace.army.mil/>

United States Census Bureau

<http://www.census.gov/>

United States Department of Agriculture

<http://www.usda.gov/wps/portal/usda/usdahome>

United State Department of Transportation

<http://www.dot.gov/>

United States Drought Monitor
<http://droughtmonitor.unl.edu/>

United States Fish and Wildlife Service
<http://www.fws.gov/>

United States Geological Survey
<http://www.usgs.gov/>

Vaisala Group
<http://www.vaisala.com/en/Pages/default.aspx>

Western Regional Climate Center.
<http://www.wrcc.dri.edu/>

Wyoming Climate Atlas
http://www.wrds.uwyo.edu/sco/climateatlas/title_page.html

Wyoming Office of Homeland Security
<http://wyohomelandsecurity.state.wy.us/main.aspx>

Wyoming State Climate Office
<http://www.wrds.uwyo.edu/sco/drought/drought.html>

Wyoming State Emergency Response Commission
<http://wyohomelandsecurity.state.wy.us/serc.aspx>

Wyoming State Engineer's Office
<http://seo.state.wy.us/>

Wyoming State Geological Survey
<http://www.wsgs.uwyo.edu/>

Wyoming Tribune Eagle
<http://www.wyomingnews.com/>

Appendix E PLAN ADOPTION

Resolution # 130220-07

RESOLUTION ADOPTING THE COMBINED CHEYENNE/LARAMIE COUNTY HAZARD MITIGATION AND STRATEGY PLAN FOR LARAMIE COUNTY, WYOMING

Whereas, Laramie County recognizes the threat that natural hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, the U.S. Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

Whereas, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments;

Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, Laramie County fully participated in the FEMA-prescribed mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

Whereas, the Wyoming Office of Homeland Security and the Federal Emergency Management Agency Region VIII officials have reviewed the "Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan", and approved it contingent upon this official adoption of the participating governing body;

Whereas, Laramie County desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the "Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan".

Whereas, adoption by the governing body for Laramie County, demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Multi-Hazard Mitigation Plan.

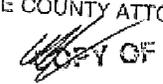
Whereas, adoption of this legitimacies the plan and authorizes responsible agencies to carry out their responsibilities under the plan.

NOW THEREFORE BE IT RESPOLVED BY THE GOVERNING BODY OF Laramie County, Wyoming, that the "Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan" as attached to this resolution is hereby adopted.

PRESENTED, READ, AND ADOPTED this 19th day of February, 2013.


Troy Thompson, Chairman

ATTEST: 
County Clerk

RECEIVED AND APPROVED AS
TO FORM ONLY BY THE
LARAMIE COUNTY ATTORNEY

COPY OF RECORD

Resolution # 130110.01

**RESOLUTION ADOPTING THE COMBINED CHEYENNE/LARAMIE COUNTY
HAZARD MITIGATION AND STRATEGY PLAN FOR ALBIN, WYOMING**

Whereas, the Town of Albin recognizes the threat that natural hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, the U.S. Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

Whereas, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments;

Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, the Town of Albin fully participated in the FEMA-prescribed mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

Whereas, the Wyoming Office of Homeland Security and the Federal Emergency Management Agency Region VIII officials have reviewed the "Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan", and approved it contingent upon this official adoption of the participating governing body;

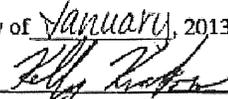
Whereas, the Town of Albin desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the "Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan".

Whereas, adoption by the governing body for the Town of Albin, demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Multi-Hazard Mitigation Plan.

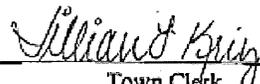
Whereas, adoption of this legitimacies the plan and authorizes responsible agencies to carry out their responsibilities under the plan.

NOW THEREFORE BE IT RESPOLVED BY THE GOVERNING BODY OF The Town of Albin, Wyoming, that the "Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan" as attached to this resolution is hereby adopted.

PRESENTED, READ, AND ADOPTED this 10th day of January, 2013.



Kelly Krakow, Mayor

ATTEST: 

Town Clerk

Resolution # 1-28-13

**RESOLUTION ADOPTING THE COMBINED CHEYENNE/LARAMIE COUNTY
HAZARD MITIGATION AND STRATEGY PLAN FOR BURNS, WYOMING**

Whereas, the Town of Burn recognizes the threat that natural hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, the U.S. Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

Whereas, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments;

Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, the Town of Burns fully participated in the FEMA-prescribed mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

Whereas, the Wyoming Office of Homeland Security and the Federal Emergency Management Agency Region VIII officials have reviewed the "Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan", and approved it contingent upon this official adoption of the participating governing body;

Whereas, the Town of Burns desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the "Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan".

Whereas, adoption by the governing body for the Town of Burns, demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Multi-Hazard Mitigation Plan.

Whereas, adoption of this legitimacies the plan and authorizes responsible agencies to carry out their responsibilities under the plan.

NOW THEREFORE BE IT RESPOLVED BY THE GOVERNING BODY OF The Town of Burns, Wyoming, that the "Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan".

PRESENTED, READ, AND ADOPTED this 28th day of Jan., 2013.

ATTEST: Joni McNamee
Town Clerk

Judy Johnstone
Judy Johnstone, Mayor

Approved as to
form only:

D. White
Date: 12/21/2012

RESOLUTION NO. 5468

ENTITLED: "A RESOLUTION ADOPTING THE COMBINED CHEYENNE/LARAMIE COUNTY HAZARD MITIGATION AND STRATEGY PLAN 2012."

WHEREAS, the Governing Body of the City of Cheyenne recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, an adopted Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, the City of Cheyenne is located within the Planning Area and City officials fully participated in the mitigation planning process to prepare the Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan 2012, which is on file and open for public inspection in the offices of the City Clerk and City Engineer; and

WHEREAS, the Wyoming Office of Homeland Security and Federal Emergency Management Agency, Region VIII officials have reviewed the Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan 2012 and approved it contingent upon this adoption by the Governing Body of the City of Cheyenne.

NOW, THEREFORE, BE IT RESOLVED BY THE GOVERNING BODY OF THE CITY OF CHEYENNE, WYOMING, that the Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan 2012 is hereby adopted as an official plan.

BE IT FURTHER RESOLVED that the Laramie County Emergency Management Agency submit this Resolution to the Wyoming Office of Homeland Security and Federal Emergency Management Agency, Region VIII officials to facilitate final approval of the Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan 2012.

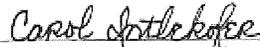
BE IT FURTHER RESOLVED that the Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan 2012 replaces the previous hazard and flood mitigation plans adopted through Resolution Nos. 4691 and 4699.

PRESENTED, READ AND ADOPTED THIS 28th DAY OF January, 2013.


Richard L. Kaysen, Mayor

(Seal)

Attest:


Carol Intlekofer, City Clerk

RESOLUTION # 2013-01

A RESOLUTION ADOPTING THE COMBINED CHEYENNE/LARAMIE COUNTY HAZARD MITIGATION AND STRATEGY PLAN FOR THE TOWN OF PINE BLUFFS, WYOMING; PROVIDING FOR SEVERABILITY AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, the Town of Pine Bluffs recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the U.S. Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

WHEREAS, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments;

WHEREAS, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, the Town of Pine Bluffs fully participated in the FEMA-prescribed mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

WHEREAS, the Wyoming Office of Homeland Security and the Federal Emergency Management Agency Region VIII officials have reviewed the "Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan", and approved it contingent upon this official adoption of the participating governing body;

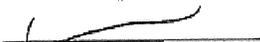
WHEREAS, the Town of Pine Bluffs desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the "Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan".

WHEREAS, adoption by the governing body for the Town of Pine Bluffs, demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Multi-Hazard Mitigation Plan.

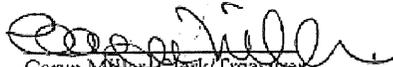
WHEREAS, adoption of this legitimacies the plan and authorizes responsible agencies to carry out their responsibilities under the plan.

NOW THEREFORE BE IT RESPOLVED BY THE GOVERNING BODY OF the Town of Pine Bluffs, Wyoming, that the "Combined Cheyenne/Laramie County Hazard Mitigation and Strategy Plan".

PASSED AND ADOPTED THIS 21st DAY OF JANUARY 2013.


William Shain, Mayor

ATTEST:


Caryn Miller, Clerk/Treasurer

Reso 2013-01

Aggregated Critical Facilities

Aggregate	Classification	Total
At Risk Population Facilities	Childcare	8
	Community Center	2
	Elderly Facilities	7
	Preschool	14
	Schools	74
	Schools - Bus Depot	1
Total		106
Essential Services Facilities	Airports	2
	Emergency Management	1
	Fire Stations	26
	Government Buildings	31
	Government Buildings - Emergency Medical	1
	Government Buildings - Power Plant	1
	Government Buildings - Transportation Center	1
	Government Buildings - Health Admin	2
	Healthcare Facilities	12
	Hospitals	4
	Law Enforcement	6
	Utilities - Water Tank	1
Total		88
Hazmat Facilities	Hazardous Materials Facilities	24
Total		24
Grand Total		218

Critical Facilities by Community

CRITICAL FACILITY	COMMUNITY	TYPE OF FACILITY
Albin Community Center	Albin	Community Center
Albin Elementary School	Albin	Schools
Albin Gym	Albin	Schools
Albin High School	Albin	Schools
Albin Post Office	Albin	Government Buildings
Albin Town Hall	Albin	Government Buildings
F.E.C. - A Co-Operativeve (OUT OF BUSINESS)	Albin	Hazardous Materials Facilities
Fire District #3	Albin	Fire Stations
Storage	Albin	Government Buildings
Burns Bus Barn	Burns	Schools - Bus Depot
Burns Bus Garage	Burns	Schools
Burns Elementary School	Burns	Schools
Burns Fire Station	Burns	Fire Stations
Burns High School	Burns	Schools
Burns Police Dept	Burns	Law Enforcement
Burns Post Office	Burns	Government Buildings
Burns Community Center	Burns	Government Buildings
Burns-Plex North	Burns	Schools
Burns-Plex South	Burns	Schools
A Mothers Touch	Cheyenne	Schools
Airport	Cheyenne	Airports
Airport Terminal	Cheyenne	Government Buildings
American Medical Response	Cheyenne	Government Buildings - Emergency Medical
American Wyott Corporation	Cheyenne	Hazardous Materials Facilities
Aspen Wind Assist Liv Cmmnty	Cheyenne	Elderly Facilities
Building Blocks Childcare Cntr	Cheyenne	Childcare
Cheyenne Dry Creek Wtp	Cheyenne	Hazardous Materials Facilities
Cheyenne Endoscopy Center	Cheyenne	Healthcare Facilities
Cheyenne Head Start	Cheyenne	Preschool
Cheyenne Healthcare Cntr	Cheyenne	Healthcare Facilities
Cheyenne Progress Center Industrial Park -CYNE Pgrss Cer\Nielson Trust	Cheyenne	Hazardous Materials Facilities

Critical Facilities by Community

CRITICAL FACILITY	COMMUNITY	TYPE OF FACILITY
Cheyenne SDA School	Cheyenne	Schools
Cheyenne Surgical Center, LLC	Cheyenne	Healthcare Facilities
Cheyenne Transit Facility	Cheyenne	Government Buildings
Cheyenne/Laramie Co Health Dept	Cheyenne	Government Buildings/Health Admin
Children's Discovery Center	Cheyenne	Preschool
Children's Good Beginnings Ctr	Cheyenne	Preschool
Children's Learning House	Cheyenne	Preschool
Churchill Elem Portable	Cheyenne	Schools
Churchill Elementary	Cheyenne	Schools
City Civic Center	Cheyenne	Government Buildings
City Garage	Cheyenne	Government Buildings
City Municipal Bldg	Cheyenne	Government Buildings
City Of Cheyenne Fire Dept	Cheyenne	Fire Stations
Cntr For Derm Surgery	Cheyenne	Healthcare Facilities
Cole School	Cheyenne	Schools
Colleen's Kiddie Care Inc	Cheyenne	Childcare
Community House	Cheyenne	Government Buildings
Community House	Cheyenne	Government Buildings
Continue Care Home Health	Cheyenne	Elderly Facilities
Corlett Elem Modular Gym	Cheyenne	Schools
Corlett Elementary	Cheyenne	Schools
County Bldg	Cheyenne	Government Buildings
County Library	Cheyenne	Government Buildings
Crow Creek Wastewater Facility	Cheyenne	Hazardous Materials Facilities
Davis Elementary Modular 1	Cheyenne	Schools
Davis School	Cheyenne	Schools
Deming School	Cheyenne	Schools
Depot	Cheyenne	Government Buildings - Transportation Center
Diamonds In The Rough Presch	Cheyenne	Preschool
Dildine School	Cheyenne	Schools
Discovery Unlimited	Cheyenne	Childcare

Critical Facilities by Community

CRITICAL FACILITY	COMMUNITY	TYPE OF FACILITY
East High School	Cheyenne	Schools
Fire & Rescue Burn Bldg	Cheyenne	Fire Stations
Fire & Rescue Training Facil.	Cheyenne	Fire Stations
Fire & Rescue Training Tower	Cheyenne	Fire Stations
Fire Station No. 1	Cheyenne	Fire Stations
Fire Station No. 2	Cheyenne	Fire Stations
Fire Station No. 3	Cheyenne	Fire Stations
Fire Station No. 5	Cheyenne	Fire Stations
Fire Station No. 6	Cheyenne	Fire Stations
Fleet Maintenance	Cheyenne	Government Buildings
Food Service/Maintenance	Cheyenne	Schools
Gingham Goose The	Cheyenne	Childcare
Happy Time Preschool	Cheyenne	Preschool
Health Department	Cheyenne	Government Buildings
Healthreach	Cheyenne	Healthcare Facilities
Hebard School	Cheyenne	Schools
Henderson School	Cheyenne	Schools
Hobbs School	Cheyenne	Schools
I Am A Promise Daycare	Cheyenne	Childcare
Jessup School	Cheyenne	Schools
Johnson Jr/Hi School	Cheyenne	Schools
Kaneb Pipeline Cheyenne Terminal	Cheyenne	Hazardous Materials Facilities
Kiddie Kollege	Cheyenne	Preschool
Kid's Korner Day Care	Cheyenne	Schools
Knife River Cheyenne	Cheyenne	Hazardous Materials Facilities
La Petite Academy	Cheyenne	Preschool
Laramie Co Cheyenne C D	Cheyenne	Law Enforcement
Laramie Co Fire Dist #2	Cheyenne	Fire Stations
Laramie Co Sch Dist Admin Bldg	Cheyenne	Schools
Laramie Co Science Center	Cheyenne	Schools
Lebhart School	Cheyenne	Schools

Critical Facilities by Community

CRITICAL FACILITY	COMMUNITY	TYPE OF FACILITY
Lemason Christian Academy	Cheyenne	Schools
Life Care Center Of Cheyenne	Cheyenne	Elderly Facilities
Light Of The World Christian	Cheyenne	Schools
Lighthouse Baptist Academy	Cheyenne	Schools
Linde, Inc.	Cheyenne	Hazardous Materials Facilities
Maintenance Shop	Cheyenne	Government Buildings
Maintenance Shop	Cheyenne	Government Buildings
Maintenance Shop	Cheyenne	Government Buildings
Maintenance Shop	Cheyenne	Government Buildings
Make a Mess & Make Believe	Cheyenne	Preschool
Mccormick Jr/Hi School	Cheyenne	Schools
Miller Elementary School	Cheyenne	Schools
Montessori School Of Cheyenne	Cheyenne	Schools
Mountain States Materials	Cheyenne	Hazardous Materials Facilities
Mtn Towers Healthcare & Rehab	Cheyenne	Healthcare Facilities
Neighborhood Facility	Cheyenne	Government Buildings
Noah Webster Christian School	Cheyenne	Schools
Our Savior Lthrn Chrch Daycare	Cheyenne	Childcare
Pioneer Park School	Cheyenne	Schools
Point Frontier Retirement	Cheyenne	Elderly Facilities
Police Station	Cheyenne	Law Enforcement
Power Bldg	Cheyenne	Government Buildings - Power Plant
Preston University	Cheyenne	Schools
Promise Patch Preschool	Cheyenne	Preschool
Pumphouse	Cheyenne	Government Buildings
Ready Care LLC	Cheyenne	Healthcare Facilities
Redeemer Lutheran School	Cheyenne	Schools
Rossman School	Cheyenne	Schools
Roundtop Water Treatment Plant	Cheyenne	Hazardous Materials Facilities
Saddle Ridge School	Cheyenne	Schools
School Admin Bldg	Cheyenne	Schools

Critical Facilities by Community

CRITICAL FACILITY	COMMUNITY	TYPE OF FACILITY
Schroll Cabinets	Cheyenne	Hazardous Materials Facilities
Se Wyoming Dialysis Cntr,LILC	Cheyenne	Healthcare Facilities
Sheriffs Bldg	Cheyenne	Law Enforcement
Sheriffs Posse Building	Cheyenne	Law Enforcement
Sierra Hills Assisted Living	Cheyenne	Elderly Facilities
South Cheyenne High School	Cheyenne	Schools
St Marys School	Cheyenne	Schools
Star Base Academy	Cheyenne	Schools
Storey Gymnasium	Cheyenne	Schools
Stride Learning Center	Cheyenne	Preschool
SunCor Energy Inc., Pipeline Warehouse	Cheyenne	Hazardous Materials Facilities
Sunrise School	Cheyenne	Schools
Traffic Shop	Cheyenne	Government Buildings
Train Traffic Tower	Cheyenne	Government Buildings
Transfer Station	Cheyenne	Government Buildings
Trinity Lthrn Preschool	Cheyenne	Preschool
Triumph High School	Cheyenne	Schools
Umc East	Cheyenne	Hospitals
Under The Sycamore Tree	Cheyenne	Preschool
United Medical Center	Cheyenne	Healthcare Facilities
UPRR Cheyenne Railroad Facility	Cheyenne	Hazardous Materials Facilities
Us Dod Usaf Wyoming Ang	Cheyenne	Hazardous Materials Facilities
Uw Family Practice Res Prog	Cheyenne	Healthcare Facilities
V.A. Hospital	Cheyenne	Hospitals
Village School The-A Montessor	Cheyenne	Schools
Water Tank	Cheyenne	Utilities - Water Tank
We Care Adult Day Care	Cheyenne	Elderly Facilities
Weed & Pest	Cheyenne	Government Buildings
WEMA	Cheyenne	Emergency Management
World Of Wonder	Cheyenne	Preschool
Wy Army Guard	Cheyenne	Government Buildings

Critical Facilities by Community

CRITICAL FACILITY	COMMUNITY	TYPE OF FACILITY
Wyoming Department of Transportation complex	Cheyenne	Government Buildings
Wy State Capitol	Cheyenne	Government Buildings
Wyoming Dept Of Health	Cheyenne	Government Buildings/Health Admin
Wyoming Outpatient Srvc, LLC	Cheyenne	Healthcare Facilities
Yellowstone Surgery Center, LLC	Cheyenne	Healthcare Facilities
Afflerbach School	County	Schools
Airgas Carbonic and Dry Ice Ice Inc.	County	Hazardous Materials Facilities
Alta Vista Elementary School	County	Schools
Anderson School	County	Schools
Arp School	County	Schools
Baggs School	County	Schools
Bain School	County	Schools
Buffalo Ridge Elementary School	County	Schools
Carey Junior High School	County	Schools
Carpenter Elementary School	County	Schools
Central High School	County	Schools
Cheyenne Board of Public Utilities - Dry Creek Plant	County	Hazardous Materials Facilities
Clawson Elementary	County	Schools
Crafco Inc Cheyenne	County	Hazardous Materials Facilities
Embry-Riddle University	County	Schools
Fairview School	County	Schools
Farmer In The Dell Daycare	County	Childcare
Fire District #1	County	Fire Stations
Fire District #1, Station #1	County	Fire Stations
Fire District #1, Station #2	County	Fire Stations
Fire District #10	County	Fire Stations
Fire District #2	County	Fire Stations
Fire District #2	County	Fire Stations
Fire District #2, Station #1	County	Fire Stations
Fire District #2, Station #2	County	Fire Stations
Fire District #2, Station #3	County	Fire Stations

Critical Facilities by Community

CRITICAL FACILITY	COMMUNITY	TYPE OF FACILITY
Fire District #3, Station #2	County	Fire Stations
Fire District #8	County	Fire Stations
Fire District #8, Station #2	County	Fire Stations
Freedom Elementary School	County	Schools
Frontier Refining Inc.	County	Hazardous Materials Facilities
Gilchrist School	County	Schools
Goins School	County	Schools
Harvest Time Day Care	County	Childcare
Headstart	County	Schools
Horse Creek Post Office	County	Government Buildings
LCCC	County	Schools
RL Sherard Water Treatment Plant	County	Hazardous Materials Facilities
Silo Gas Plant	County	Hazardous Materials Facilities
Tetra Micronutrients Inc	County	Hazardous Materials Facilities
Wal-Mart Distribution Center #7077	County	Hazardous Materials Facilities
Willadsen Elementary	County	Schools
Admin Building	Pine Bluffs	Government Buildings
Frenchman Valley Coop - Pine Bluff, Wy - NH3	Pine Bluffs	Hazardous Materials Facilities
Pine Bluffs Admin	Pine Bluffs	Schools
Pine Bluffs Airport	Pine Bluffs	Airports
Pine Bluffs Community Center	Pine Bluffs	Community Center
Pine Bluffs Elementary School	Pine Bluffs	Schools
Pine Bluffs Fire Station	Pine Bluffs	Fire Stations
Pine Bluffs High School	Pine Bluffs	Schools
Pine Bluffs High School - Old	Pine Bluffs	Schools
Pine Bluffs High School Gym	Pine Bluffs	Schools
Pine Bluffs Police	Pine Bluffs	Law Enforcement
Whispering Pines Care Home	Pine Bluffs	Elderly Facilities
F.E. Warren AFB Wyoming	Warren AFB	Hazardous Materials Facilities
F.E. Warren Air Base Fire Dept	Warren AFB	Fire Stations
F.E. Warren Air Base Fire Dept	Warren AFB	Hospitals

Critical Facilities by Community

CRITICAL FACILITY	COMMUNITY	TYPE OF FACILITY
U S Air Force Hospital	Warren AFB	Hospitals

Critical Facilities by Hazards

Community	Aggregate	Type of Facility	Critical Facility	Flood Zone	Railroad Haz Route	Hwy Haz Route	Redzone
Cheyenne	At Risk Population Facilities	Schools	A Mothers Touch	No	Yes	Yes	No
Pine Bluffs	Essential Services Facilities	Government Buildings	Admin Building	No	Yes	Yes	No
County	At Risk Population Facilities	Schools	Afflerbach School	No	No	No	Yes
County	Hazmat Facilities	Hazardous Materials Facilities	Airgas Carbonic and Dry Ice Inc.	No	Yes	No	Yes
Cheyenne	Essential Services Facilities	Airports	Airport	No	No	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings	Airport Terminal	No	No	No	No
Albin	At Risk Population Facilities	Community Center	Albin Community Center	No	Yes	No	No
Albin	At Risk Population Facilities	Schools	Albin Elementary School	No	Yes	No	No
Albin	At Risk Population Facilities	Schools	Albin Gym	No	Yes	No	No
Albin	At Risk Population Facilities	Schools	Albin High School	No	Yes	No	No
Albin	Essential Services Facilities	Government Buildings	Albin Post Office	No	Yes	No	No
Albin	Essential Services Facilities	Government Buildings	Albin Town Hall	No	Yes	No	No
County	At Risk Population Facilities	Schools	Alta Vista Elementary School	No	Yes	No	No
Cheyenne	Essential Services Facilities	Government Buildings - Emergency Medical	American Medical Response	No	Yes	Yes	No
Cheyenne	Hazmat Facilities	Hazardous Materials Facilities	American Wyott Corporation	No	Yes	Yes	No
County	At Risk Population Facilities	Schools	Anderson School	No	No	No	No
County	At Risk Population Facilities	Schools	Arp School	No	No	Yes	Yes
Cheyenne	At Risk Population Facilities	Elderly Facilities	Aspen Wind Assist Liv Cmmnty	No	Yes	Yes	No
County	At Risk Population Facilities	Schools	Baggs School	No	No	No	No
County	At Risk Population Facilities	Schools	Bain School	1% Annual Chance	Yes	Yes	Yes
County	At Risk Population Facilities	Schools	Buffalo Ridge Elementary Schoo	No	No	No	No
Cheyenne	At Risk Population Facilities	Childcare	Building Blocks Childcare Cntr	No	Yes	No	No
Burns	At Risk Population Facilities	Schools - Bus Depot	Burns Bus Barn	No	Yes	No	Yes
Burns	At Risk Population Facilities	Schools	Burns Bus Garage	No	Yes	No	Yes
Burns	Essential Services Facilities	Government Buildings	Burns Community Center	No	Yes	No	Yes
Burns	At Risk Population Facilities	Schools	Burns Elementary School	No	Yes	No	Yes
Burns	Essential Services Facilities	Fire Stations	Burns Fire Station	No	Yes	No	Yes
Burns	At Risk Population Facilities	Schools	Burns High School	No	Yes	No	Yes
Burns	Essential Services Facilities	Law Enforcement	Burns Police Dept	No	Yes	No	Yes
Burns	Essential Services Facilities	Government Buildings	Burns Post Office	No	Yes	No	Yes
Burns	At Risk Population Facilities	Schools	Burns-Plex North	No	Yes	No	Yes
Burns	At Risk Population Facilities	Schools	Burns-Plex South	No	Yes	No	Yes
County	At Risk Population Facilities	Schools	Carey Junior High School	No	Yes	No	No
County	At Risk Population Facilities	Schools	Carpenter Elementary School	No	Yes	No	No
County	At Risk Population Facilities	Schools	Central High School	No	Yes	Yes	Yes
County	Hazmat Facilities	Hazardous Materials Facilities	Cheyenne Board of Public Utilities - Dry Creek Plant	1% Annual Chance	Yes	Yes	Yes
Cheyenne	Hazmat Facilities	Hazardous Materials Facilities	Cheyenne Dry Creek WTP	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Healthcare Facilities	Cheyenne Endoscopy Center	1% Annual Chance	Yes	No	No
Cheyenne	At Risk Population Facilities	Preschool	Cheyenne Head Start	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Healthcare Facilities	Cheyenne Healthcare Cntr	No	Yes	Yes	No
Cheyenne	Hazmat Facilities	Hazardous Materials Facilities	Cheyenne Progress Center Industrial Park -CYNE Pgrss Cer/Nielson Trust	1% Annual Chance	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Cheyenne Sda School	No	No	No	No
Cheyenne	Essential Services Facilities	Healthcare Facilities	Cheyenne Surgical Center, LLC	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings	Cheyenne Transit Facility	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings/Health Admin	Cheyenne/Laramie Co Health Dept	0.2% Annual Chance	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Preschool	Children's Discovery Center	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Preschool	Children's Good Beginnings Ctr	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Preschool	Children's Learning House	No	Yes	No	No
Cheyenne	At Risk Population Facilities	Schools	Churchill Elem Portable	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Churchill Elementary	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings	City Civic Center	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings	City Garage	No	Yes	Yes	Yes
Cheyenne	Essential Services Facilities	Government Buildings	City Municipal Bldg	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Fire Stations	City Of Cheyenne Fire Dept	No	Yes	No	No
County	At Risk Population Facilities	Schools	Clawson Elementary	No	Yes	No	Yes
Cheyenne	Essential Services Facilities	Healthcare Facilities	Cntr For Derm Surgery	No	No	Yes	Yes

Critical Facilities by Hazards

Community	Aggregate	Type of Facility	Critical Facility	Flood Zone	Railroad Haz Route	Hwy Haz Route	Redzone
Cheyenne	At Risk Population Facilities	Schools	Cole School	1% Annual Chance	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Childcare	Colleen'S Kiddie Care Inc	No	Yes	No	No
Cheyenne	Essential Services Facilities	Government Buildings	Community House	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings	Community House	No	No	Yes	No
Cheyenne	At Risk Population Facilities	Elderly Facilities	Continue Care Home Health	No	No	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Corlett Elem Modular Gym	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Corlett Elementary	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings	County Bldg	No	Yes	No	No
Cheyenne	Essential Services Facilities	Government Buildings	County Library	No	Yes	Yes	No
County	Hazmat Facilities	Hazardous Materials Facilities	Crafco Inc Cheyenne	No	Yes	Yes	Yes
Cheyenne	Hazmat Facilities	Hazardous Materials Facilities	Crow Creek Wastewater Facility	No	Yes	Yes	Yes
Cheyenne	At Risk Population Facilities	Schools	Davis Elementary Modular 1	No	No	Yes	Yes
Cheyenne	At Risk Population Facilities	Schools	Davis School	No	No	Yes	Yes
Cheyenne	At Risk Population Facilities	Schools	Deming School	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings - Transportation Center	Depot	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Preschool	Diamonds In The Rough Presch	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Dildine School	No	No	No	No
Cheyenne	At Risk Population Facilities	Childcare	Discovery Unlimited	No	Yes	No	No
Cheyenne	At Risk Population Facilities	Schools	East High School	No	No	No	No
County	At Risk Population Facilities	Schools	Embry-Riddle University	No	Yes	Yes	No
Warren AFB	Hazmat Facilities	Hazardous Materials Facilities	F.E. Warren AFB Wyoming	No	Yes	No	No
Warren AFB	Essential Services Facilities	Fire Stations	F.E. Warren Air Base Fire Dept	No	Yes	Yes	No
Warren AFB	Essential Services Facilities	Hospitals	F.E. Warren Air Base Fire Dept	No	Yes	Yes	No
Albin	Hazmat Facilities	Hazardous Materials Facilities	F.E.C. - A Co-Operative (OUT OF BUSINESS)	No	No	No	No
County	At Risk Population Facilities	Schools	Fairview School	No	Yes	Yes	No
County	At Risk Population Facilities	Childcare	Farmer In The Dell Daycare	0.2% Annual Chance	No	Yes	Yes
Cheyenne	Essential Services Facilities	Fire Stations	Fire & Rescue Bum Bldg	No	Yes	Yes	Yes
Cheyenne	Essential Services Facilities	Fire Stations	Fire & Rescue Training Facil.	No	Yes	Yes	Yes
Cheyenne	Essential Services Facilities	Fire Stations	Fire & Rescue Training Tower	No	Yes	Yes	Yes
County	Essential Services Facilities	Fire Stations	Fire District #1	No	No	Yes	Yes
County	Essential Services Facilities	Fire Stations	Fire District #1, Station #1	No	No	Yes	Yes
County	Essential Services Facilities	Fire Stations	Fire District #1, Station #2	No	No	No	Yes
County	Essential Services Facilities	Fire Stations	Fire District #10	No	Yes	Yes	No
County	Essential Services Facilities	Fire Stations	Fire District #2	No	No	Yes	Yes
County	Essential Services Facilities	Fire Stations	Fire District #2	No	No	No	No
County	Essential Services Facilities	Fire Stations	Fire District #2, Station #1	No	No	No	No
County	Essential Services Facilities	Fire Stations	Fire District #2, Station #2	No	No	Yes	Yes
County	Essential Services Facilities	Fire Stations	Fire District #2, Station #3	No	Yes	No	Yes
Albin	Essential Services Facilities	Fire Stations	Fire District #3	No	Yes	No	No
County	Essential Services Facilities	Fire Stations	Fire District #3, Station #2	No	No	No	Yes
County	Essential Services Facilities	Fire Stations	Fire District #3	No	No	No	Yes
County	Essential Services Facilities	Fire Stations	Fire District #3, Sta #2	No	No	No	Yes
Cheyenne	Essential Services Facilities	Fire Stations	Fire Station No. 1	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Fire Stations	Fire Station No. 2	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Fire Stations	Fire Station No. 3	No	Yes	No	No
Cheyenne	Essential Services Facilities	Fire Stations	Fire Station No. 5	No	No	No	No
Cheyenne	Essential Services Facilities	Fire Stations	Fire Station No. 6	No	Yes	Yes	Yes
Cheyenne	Essential Services Facilities	Government Buildings	Fleet Maintenance	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Food Service/Maintenance	No	Yes	No	No
County	At Risk Population Facilities	Schools	Freedom Elementary School	No	Yes	Yes	No
Pine Bluffs	Hazmat Facilities	Hazardous Materials Facilities	Frenchman Valley Coop - Pine Bluff, Wv - NH3	No	Yes	Yes	No
County	Hazmat Facilities	Hazardous Materials Facilities	Frontier Refining Inc.	No	Yes	Yes	No
County	At Risk Population Facilities	Schools	Gilchrist School	No	No	No	Yes
Cheyenne	At Risk Population Facilities	Childcare	Gingham Goose The	1% Annual Chance	Yes	No	No
County	At Risk Population Facilities	Schools	Goins School	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Preschool	Happy Time Preschool	No	No	No	No

Critical Facilities by Hazards

Community	Aggregate	Type of Facility	Critical Facility	Flood Zone	Railroad Haz Route	Hwy Haz Route	Redzone
County	At Risk Population Facilities	Childcare	Harvest Time Day Care	1% Annual Chance	No	No	Yes
County	At Risk Population Facilities	Schools	Headstart	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings	Health Department	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Healthcare Facilities	Healthreach	0.2% Annual Chance	No	No	No
Cheyenne	At Risk Population Facilities	Schools	Hebard School	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Henderson School	No	Yes	No	No
Cheyenne	At Risk Population Facilities	Schools	Hobbs School	No	No	No	No
County	Essential Services Facilities	Government Buildings	Horse Creek Post Office	No	Yes	No	Yes
Cheyenne	At Risk Population Facilities	Childcare	I Am A Promise Daycare	No	No	Yes	Yes
Cheyenne	At Risk Population Facilities	Schools	Jessup School	No	Yes	Yes	Yes
Cheyenne	At Risk Population Facilities	Schools	Johnson Jr Hi School	No	Yes	Yes	No
Cheyenne	Hazmat Facilities	Hazardous Materials Facilities	Kaneb Pipeline_Cheyenne Terminal	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Preschool	Kiddie Kollege	No	No	No	No
Cheyenne	At Risk Population Facilities	Schools	Kid'S Komer Day Care	1% Annual Chance	Yes	No	No
Cheyenne	Hazmat Facilities	Hazardous Materials Facilities	Knife River Cheyenne	1% Annual Chance	Yes	Yes	Yes
Cheyenne	At Risk Population Facilities	Preschool	La Petite Academy	0.2% Annual Chance	No	No	No
Cheyenne	Essential Services Facilities	Law Enforcement	Laramie Co Cheyenne C D	No	Yes	No	No
Cheyenne	Essential Services Facilities	Fire Stations	Laramie Co Fire Dist #2	No	No	Yes	Yes
Cheyenne	At Risk Population Facilities	Schools	Laramie Co Sch Dist Admin Bldg	No	Yes	No	No
Cheyenne	At Risk Population Facilities	Schools	Laramie Co Science Center	No	Yes	Yes	Yes
County	At Risk Population Facilities	Schools	LCCC	No	No	No	Yes
Cheyenne	At Risk Population Facilities	Schools	Lebhart School	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Lemason Christian Academy	No	No	No	No
Cheyenne	At Risk Population Facilities	Elderly Facilities	Life Care Center Of Cheyenne	No	No	No	No
Cheyenne	At Risk Population Facilities	Schools	Light Of The World Christian	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Lighthouse Baptist Academy	1% Annual Chance	No	Yes	Yes
Cheyenne	Hazmat Facilities	Hazardous Materials Facilities	Linde, Inc.	No	Yes	Yes	Yes
Cheyenne	Essential Services Facilities	Government Buildings	Maintenance Shop	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings	Maintenance Shop	No	No	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings	Maintenance Shop	No	No	No	No
Cheyenne	Essential Services Facilities	Government Buildings	Maintenance Shop	1% Annual Chance	Yes	No	No
Cheyenne	At Risk Population Facilities	Preschool	Make A Mess & Make Believe	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Mccormick Jr Hi School	No	No	Yes	Yes
Cheyenne	At Risk Population Facilities	Schools	Miller Elementary School	No	Yes	No	No
Cheyenne	At Risk Population Facilities	Schools	Montesson School Of Cheyenne	No	No	Yes	No
Cheyenne	Hazmat Facilities	Hazardous Materials Facilities	Mountain States Materials	No	Yes	Yes	Yes
Cheyenne	Essential Services Facilities	Healthcare Facilities	Mtn Towers Healthcare&Rehab	1% Annual Chance	Yes	No	No
Cheyenne	Essential Services Facilities	Government Buildings	Neighborhood Facility	1% Annual Chance	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Noah Webster Christian School	No	No	No	No
Cheyenne	At Risk Population Facilities	Childcare	Our Savior Lthm Chrch Daycare	No	No	No	No
Pine Bluffs	At Risk Population Facilities	Schools	Pine Bluffs Admin	No	Yes	Yes	No
Pine Bluffs	Essential Services Facilities	Airports	Pine Bluffs Airport	No	Yes	Yes	No
Pine Bluffs	At Risk Population Facilities	Community Center	Pine Bluffs Community Center	No	Yes	Yes	No
Pine Bluffs	At Risk Population Facilities	Schools	Pine Bluffs Elementary School	No	Yes	Yes	No
Pine Bluffs	Essential Services Facilities	Fire Stations	Pine Bluffs Fire Station	No	Yes	Yes	No
Pine Bluffs	At Risk Population Facilities	Schools	Pine Bluffs High School	No	Yes	Yes	No
Pine Bluffs	At Risk Population Facilities	Schools	Pine Bluffs High School - Old	No	Yes	Yes	No
Pine Bluffs	At Risk Population Facilities	Schools	Pine Bluffs High School Gym	No	Yes	Yes	No
Pine Bluffs	Essential Services Facilities	Law Enforcement	Pine Bluffs Police	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Pioneer Park School	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Elderly Facilities	Point Frontier Retirement	No	No	No	No
Cheyenne	Essential Services Facilities	Law Enforcement	Police Station	No	Yes	No	No
Cheyenne	Essential Services Facilities	Government Buildings - Power Plant	Power Bldg	No	No	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Preston University	No	No	No	No
Cheyenne	At Risk Population Facilities	Preschool	Promise Patch Preschool	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings	Pumphouse	No	Yes	Yes	No

Critical Facilities by Hazards

Community	Aggregate	Type of Facility	Critical Facility	Flood Zone	Railroad Haz Route	Hwy Haz Route	Redzone
Cheyenne	Essential Services Facilities	Healthcare Facilities	Ready Care Lic	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Redeemer Lutheran School	No	Yes	No	No
County	Hazmat Facilities	Hazardous Materials Facilities	RL Sherard Water Treatment Plant	No	No	No	Yes
Cheyenne	At Risk Population Facilities	Schools	Rossman School	No	No	Yes	Yes
Cheyenne	Hazmat Facilities	Hazardous Materials Facilities	Roundtop Water Treatment Plant	No	Yes	No	Yes
Cheyenne	At Risk Population Facilities	Schools	Saddle Ridge School	No	Yes	No	No
Cheyenne	At Risk Population Facilities	Schools	School Admin Bldg	No	Yes	Yes	No
Cheyenne	Hazmat Facilities	Hazardous Materials Facilities	Schroll Cabinets	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Healthcare Facilities	Se Wyoming Dialysis Cntr.LILC	No	Yes	No	No
Cheyenne	Essential Services Facilities	Law Enforcement	Sheriffs Bldg	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Law Enforcement	Sheriffs Posse Building	No	No	Yes	Yes
Cheyenne	At Risk Population Facilities	Elderly Facilities	Sierra Hills Assisted Living	No	No	No	No
County	Hazmat Facilities	Hazardous Materials Facilities	Silo Gas Plant	No	No	No	Yes
Cheyenne	At Risk Population Facilities	Schools	South Cheyenne High School	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	St Marys School	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Star Base Academy	No	No	Yes	No
Abin	Essential Services Facilities	Government Buildings	Storage	No	Yes	No	No
Cheyenne	At Risk Population Facilities	Schools	Storey Gymnasium	No	Yes	No	No
Cheyenne	At Risk Population Facilities	Preschool	Stride Learning Center	No	Yes	Yes	No
Cheyenne	Hazmat Facilities	Hazardous Materials Facilities	SunCor Energy Inc., Pipeline Warehouse	No	Yes	Yes	No
Cheyenne	At Risk Population Facilities	Schools	Sunrise School	No	Yes	Yes	No
County	Hazmat Facilities	Hazardous Materials Facilities	Tetra Micronutrients Inc	No	Yes	Yes	Yes
Cheyenne	Essential Services Facilities	Government Buildings	Traffic Shop	No	Yes	No	No
Cheyenne	Essential Services Facilities	Government Buildings	Train Traffic Tower	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings	Transfer Station	No	Yes	Yes	Yes
Cheyenne	At Risk Population Facilities	Preschool	Trinity Lthm Preschool	1% Annual Chance	Yes	No	No
Cheyenne	At Risk Population Facilities	Schools	Triumph High School	No	No	Yes	Yes
Warren AFB	Essential Services Facilities	Hospitals	U S Air Force Hospital	No	Yes	No	No
Cheyenne	Essential Services Facilities	Hospitals	UMC East	No	Yes	No	No
Cheyenne	At Risk Population Facilities	Preschool	Under The Sycamore Tree	No	No	No	No
Cheyenne	Essential Services Facilities	Healthcare Facilities	United Medical Center	No	Yes	No	No
Cheyenne	Hazmat Facilities	Hazardous Materials Facilities	UPRR Cheyenne Railroad Facility	No	Yes	Yes	No
Cheyenne	Hazmat Facilities	Hazardous Materials Facilities	US DOD USAF Wyoming Ang	No	No	Yes	No
Cheyenne	Essential Services Facilities	Healthcare Facilities	Uw Family Practice Res Prog	No	Yes	No	No
Cheyenne	Essential Services Facilities	Hospitals	V.A. Hospital	No	No	No	No
Cheyenne	At Risk Population Facilities	Schools	Village School The-A Montessor	No	Yes	No	No
County	Hazmat Facilities	Hazardous Materials Facilities	Wal-Mart Distribution Center #7077	No	No	Yes	Yes
Cheyenne	Essential Services Facilities	Utilities - Water Tank Red	Water Tank	No	No	No	No
Cheyenne	At Risk Population Facilities	Elderly Facilities	We Care Adult Day Care	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings	Weed & Pest	No	No	No	No
Cheyenne	Essential Services Facilities	Emergency Management	WEMA	No	Yes	Yes	No
Pine Bluffs	At Risk Population Facilities	Elderly Facilities	Whispering Pines Care Home	No	Yes	Yes	No
County	At Risk Population Facilities	Schools	Willadsen Elementary	No	Yes	Yes	Yes
Cheyenne	At Risk Population Facilities	Preschool	World Of Wonder	No	No	No	No
Cheyenne	Essential Services Facilities	Government Buildings	Wy Army Guard	No	Yes	Yes	Yes
Cheyenne	Essential Services Facilities	Government Buildings	Wy DOT	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings	Wy State Capitol	No	Yes	Yes	No
Cheyenne	Essential Services Facilities	Government Buildings/Health Admin	Wyoming Dept Of Health	No	Yes	No	No
Cheyenne	Essential Services Facilities	Healthcare Facilities	Wyoming Outpatient Srvc., LLC	No	No	No	No
Cheyenne	Essential Services Facilities	Healthcare Facilities	Yellowstone Surgery Center.LLC	No	No	Yes	No

Appendix G HISTORIC RESOURCES

Table G.1 lists the properties and districts in Laramie County that are on the National Register of Historic Places. The Laramie County/City of Cheyenne GIS Department supplied data on locally recognized historic places. Table G.2 lists the historic sites on file with County GIS.

Table G.1 National Register of Historic Places: Laramie County

Property	Jurisdiction	Address	Date Listed
Atlas Theater	Laramie County - Cheyenne	213 W. 16 th St.	4/3/1973
Baxter Ranch Headquarters Building	Laramie County - Cheyenne	912-922 E. 18 th St. and 1810-1920 Morrie Avenue	6/14/1979
Charles L. Beatty House	Laramie County - Cheyenne	2320 Capitol Ave.	6/28/1990
Boeing/United Airlines Terminal Building, Hangar, and Fountain	Laramie County - Cheyenne	200 E. 8 th Ave.	2/7/1985
Capitol North Historic District	Laramie County - Cheyenne	Bounded by E. 29 th and E. 25 th Sts., and Warren and Pioneer Aves.	12/10/1980
Castle on 19 th St.	Laramie County - Cheyenne	1318 E. 19 th St.	7/10/1979
Cheyenne Flour Milling Company	Laramie County - Cheyenne	810-814 W. 23 rd St.	10/13/2003
Cheyenne High School	Laramie County - Cheyenne	2810 House Ave.	8/22/2005
Cheyenne South Side Historic District	Laramie County - Cheyenne	Bounded by Warren Ave., Russell Ave., E. 10 th St., and E. 5 th St.	10/11/2006
Churchill Public School	Laramie County - Cheyenne	510 W. 29 th St.	8/22/2005
City and County Building	Laramie County - Cheyenne	19 th St. and Carey Ave.	11/30/1978
Continental Oil Company	Laramie County - Cheyenne	801 W. 19 th St.	10/13/2003
Corlett School	Laramie County - Cheyenne	600 W. 22 nd St.	8/22/2005
Crook House	Laramie County - Cheyenne	314 E. 21 st St.	7/10/1979
Crow Creek—Cole Ranch Headquarters Historic District	Laramie County - Cheyenne	1065 Happy Jack Rd.	7/14/2009
Deming School	Laramie County - Cheyenne	715 W. 5 th Ave.	8/22/2005
Dereemer Ranch Historic District	Laramie County - Cheyenne	East of Horse Creek	11/25/1983
Downtown Cheyenne Historic District	Laramie County - Cheyenne	Bounded by 15 th and 16 th Sts., and Central and Pioneer Aves.	12/22/1978
Downtown Cheyenne Historic District, Boundary Increase I	Laramie County - Cheyenne	Bounded by 17 th and 18 th Sts., Pioneer and Carey Aves, also along Central Ave. and 17 th St.	12/22/1980
Downtown Cheyenne Historic	Laramie County	Bounded by 19 th St. Capitol Ave., 17 th	5/20/1988

Property	Jurisdiction	Address	Date Listed
District, Boundary Increase II	– Cheyenne	St., and Carey Ave.	
Downtown Cheyenne Historic District, Boundary Increase III	Laramie County – Cheyenne	Bounded by 18 th St., Carey Ave., 16 th St., and Warren St.	8/22/1996
Federal Office Building	Laramie County – Cheyenne	308 W. 21 st St.	10/12/2000
Mable Fincher School	Laramie County – Cheyenne	2201 Morrie Ave.	8/22/2005
First United Methodist Church	Laramie County – Cheyenne	NE corner of 18 th St. and Central Ave.	2/25/1975
Fort David A. Russell	Laramie County – Cheyenne	West side of Cheyenne	10/1/1969
Moreton Frewen House	Laramie County – Cheyenne	506 E. 23 rd St.	4/14/1975
Governor's Mansion	Laramie County – Cheyenne	300 E. 21 st St.	9/30/1969
Hebard Public School	Laramie County – Cheyenne	413 Seymour Ave.	8/22/2005
Hynds Lodge	Laramie County – Cheyenne	Curt Gowdy State Park	3/23/1984
Johnson Public School	Laramie County – Cheyenne	711 Warren Ave.	8/22/2005
Keefe Row	Laramie County – Cheyenne	E. 22 nd St. and Evans Ave.	8/3/1979
Ferdinand Lafrentz House	Laramie County – Cheyenne	2015 Warren Ave.	7/17/1979
Lakeview Historic District	Laramie County – Cheyenne	Bounded by 27 th St., Seymour, Maxwell, and Warren Ave.	8/5/1996
Laramie County Milk Producers Cooperative Association	Laramie County – Cheyenne	1122 W. 23 rd St.	10/13/2003
Masonic Temple	Laramie County – Cheyenne	1820 Capitol Ave.	10/25/1984
McCord-Brady Company	Laramie County – Cheyenne	1506 Thomes Ave.	10/13/2003
Lulu McCormick Junior High School	Laramie County – Cheyenne	2001 Capitol Ave.	8/22/2005
McDonald Ranch	Laramie County – Chugwater vicinity	14 miles SW of Chugwater on S side of Laramie County line	5/14/1987
Moore Haven Heights Historic District	Laramie County – Cheyenne	Bounded by Bent Ave., Central Ave., W. 8 th Ave., and W. Pershing Blvd.	1/8/2009
Nagle-Warren Mansion	Laramie County – Cheyenne	222 E. 17 th St.	7/12/1976
Park Addition School	Laramie County – Cheyenne	1100 Richardson Ct.	8/22/2005
Pine Bluffs High School	Laramie County – Pine Bluffs	Junction of 7 th and Elm Sts.	3/21/1996
Rainsford Historic District	Laramie County	Bounded by Morrie Ave., 22 nd St.,	11/6/1984

Property	Jurisdiction	Address	Date Listed
	- Cheyenne	Warren Ave., and 17 th St.	
Remount Ranch	Laramie County - Cheyenne	Remount Ranch Rd., 1 mile south of U.S. 80	9/19/1990
St. Mark's Episcopal Church	Laramie County - Cheyenne	1908 Central Ave.	2/26/1970
St. Mary's Catholic Cathedral	Laramie County - Cheyenne	2107 Capitol Ave.	11/20/1974
Storey Gymnasium	Laramie County - Cheyenne	2811 House Ave.	8/22/2005
William Sturgis House	Laramie County - Cheyenne	821 E. 17 th St.	11/8/1982
Texas Oil Company	Laramie County - Cheyenne	1122 W. 23 rd St.	10/13/2003
Union Pacific Railroad Depot	Laramie County - Cheyenne	121 W. 15 th St.	1/29/1973
Union Pacific Roundhouse, Turntable, and Machine Shop	Laramie County - Cheyenne	121 W. 15 th St.	7/24/1992
Van Tassell Carriage Barn	Laramie County - Cheyenne	1010 E. 16 th St.	9/13/1978
Whipple-Lacey House	Laramie County - Cheyenne	300 E. 17 th St.	5/15/1980
Wyoming Fuel Company	Laramie County - Cheyenne	720 W. 18 th St.	10/13/2003
Wyoming State Capitol and Grounds	Laramie County - Cheyenne	24 th St. and Capitol Ave.	1/29/1973

Source: National Register Information System, www.nr.nps.gov/

Table G.2 Laramie County Historic Places (Laramie County GIS)

Historic Site	Type of Site
Allen Ranch	Ranch
Altus	Community/Stop
Altvan	Community/Stop
Archer	Community/Stop
Arcola	Community/Stop
Arp Ranch*	Ranch
Borie	Community/Stop
Bristol Ranch	Ranch
Campstool	Community/Stop
Coad Ranch	Ranch
Cole Ranch*	Ranch
Corlett*	Community/Stop

Historic Site	Type of Site
Durham	Community/Stop
Emlay	Community/Stop
Farthing Ranch*	Ranch
Farthing Station	Community/Stop
Federal	Community/Stop
Ferguson Ranch	Ranch
Gilchrist Ranch	Ranch
Gorman Ranch	Ranch
Harriman	Community/Stop
Harter Ranch	Ranch
Heasmans Ranch*	Ranch
Hereford Ranch	Ranch
Horse Creek Station*	Community/Stop
Iron Mountain*	Community/Stop
Irwin Ranch*	Ranch
Islay	Community/Stop
JD Ranch*	Ranch
Jim Crow Ranch*	Ranch
Jordan*	Community/Stop
Kirkbridge Ranch	Ranch
Lindbergh	Community/Stop
Lynch	Community/Stop
McGee Ranch*	Ranch
McLaughlin Ranch	Ranch
McPhee Ranch	Ranch
Meriden	Community/Stop
Moffatt Ranch	Ranch
Nimmo Ranch	Ranch
Otto	Community/Stop
Ozone	Community/Stop
PC Ranch	Ranch
8 Unnamed Schools	School
Silver Crown	Community/Stop
Speer	Community/Stop
Stevenson Ranch	Ranch
Termaine	Community/Stop
Terry Ranch	Ranch

Historic Site	Type of Site
Tracy	Community/Stop
Underwood*	Community/Stop
Van Tassell Ranch	Ranch
Warren Farm	Ranch
Warren Pole Creek Ranch	Ranch
Whitaker Ranch*	Ranch
Willadson Ranch	Ranch

Source: Laramie County/City of Cheyenne GIS

*Located in flood zone